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ENGINEERING AND EQUIPMENT
No. 24



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18 October 1976

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

ENGINEERING AND EQUIPMENT

No. 24

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ENGINEERING
Acoustical & Ultrasonic

USSR

UDC [697.644.1:697.38+533.6].001.4

ANPILOGOVA, L.I., SASIN, V.I., TEREKHOV, A.L.

PROBLEM OF EVALUATING ACOUSTIC IMPROVEMENT IN HEATING UNITS

Moscow TR. TSENTR. N.-I I PROYEKT.-EKSPERIM. IN-TA PROM. ZHDANIY I SOORUZH.
[Transactions of the Central Scientific Research and Experimental Planning
Institute of Industrial Buildings and Structures] in Russian No 38, 1975
pp 175-178

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 2 1976 Abstract 2S202]

[Text] It is suggested that a rough estimate of the acoustic improvement in air heating units be made from the experimentally determined relationship of the level of acoustic pressure (db) to the power output coefficient, equal to $(\rho K \theta) / (\mu H)$, where ρ is the density of the air under standard conditions; K is the coefficient of heat transfer of the calorifier, $B_T / (M^2 \cdot K)$; μ is the mass air flow in kg/sec; H is the total head of the fan, Π_a ; θ is the conditional standard difference in the temperatures of the heat-transfer agent and the air, assumed as $1^\circ C$. Illustrations 1, references 3.

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USSR

BOLOGA, M. K., PAUKOV, YU. N., TTYAN, S. A., BARSKIY, E. L. and
LOPUKHOV, I. P.

VIBROACOUSTICAL PARAMETERS OF THE ZONE OF SEPARATION CAVITATION
UNDER THE INFLUENCE OF AN ELECTRICAL CURRENT

Moscow SIMPOZ PO FIZ AKUST-GIDRODINAM YAVLENIY, SUKHUMI, 1975 [Symposium on the Physics of Acoustical-Hydrodynamic Phenomena, Sukhumi, 1975, Collection of Works] in Russian, Izd-vo Nauka, 1975 pp 186-191

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B763
by Ye. N. Lysov]

[Text] The authors discuss the results of an experimental investigation on the influence of a direct electrical current on the macrostructure of the cavitation region in laminar and turbulent regimes of flow around the cavitator, and also on the integral and spectral characteristics of cavitation noise under conditions of the turbulent regime of flow.

The authors establish that under the electrical effect (constant voltage fed between the model and the auxiliary electrode placed

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BOLOGA, M. K., PAUKOV, YU. N., TTYAN, S. A., BARSKIY, E. L. and LOPUKHOV, I. P., SIMPOZ PO FIZ AKUST-GIDRODINAM YAVLENIY, SUKHUMI, 1975 pp 186-191 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B763]

lower in the stream) the macrostructure of the cavitation zone under conditions of flow around the cavitator with a laminar boundary layer undergoes the most substantial changes. The fixing adjustment of the structure begins already at stages of development of cavitation $\lambda \leq 3.0$. The electrical current leads to a decrease in the zone in length and width, to a change in the shape of the cavities, dimensions and structure of the separating tail part. Adjustment of the structure is accompanied by the onset of sharp noise.

Of special interest are the results of the electrical effect on the initial stages of cavitation. The authors establish that when $\lambda \leq 1.2$ the effect of the current ensures complete annihilation of the cavitation structures and, as a consequence, a significant reduction (by 3.5 times) in the amount of disappearing cavitation. Adjustment of the structure of the zone or its annihilation begins

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USSR

BOLOGA, M. K., PAUKOV, YU. N., TTYAN, S. A., BARSKIY, E. L. and LOPUKHOV, I. P., SIMPOZ PO FIZ AKUST-GIDRODINAM YAVLENIY, SUKHUMI, 1975 pp 186-191 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B763]

at a predetermined current density, after which any further increase in it will not change the created flow pattern. At the same time with cessation of the electrical effect at all stages of cavitation the initial flow pattern is restored.

The effect of the electrical current is expressed also in the frequency of cavity separation, the degree of its influence being determined both by the stage of cavitation development and by the current density.

Analysis of the pressure distribution curves on the surface of the cavitator reveals that the reason for the observed effects is the turbulization of the boundary layer caused by the effect of the current. In accordance with the character of the change in pressure distribution on the cavitator both the flow pattern and the coefficient of resistance of the model change, the maximal reduction in it (up to 30%) corresponding to the annihilation of cavitation.

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USSR

BOLOGA, M. K., PAUKOV, YU. N., TTYAN, S. A., BARSKIY, E. L. and LOPUKHOV, I. P., SIMPOZ PO FIZ AKUST-GIDRODINAM YAVLENIY, SUKHUMI, 1975 pp 186-191 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B763]

When there is flow around the cavitator with a turbulent boundary layer at cavitations stages of $1.0 < \lambda < 3.0$ the electrical current increases the length of the zone virtually without changing its structure. At the initial stages ($\lambda \leq 1.0$) the effect of the current is accompanied by a smearing of the zone, a decrease in the cavity intensity and, ultimately, by an annihilation of the cavitation structures. Analysis of the pressure distribution curves reveals that the electrical effect will lead to an increase in the pressure behind the model, to a further shift of the angles of separation of the stream and, as a consequence, to a significant (up to 40%) reduction in the coefficient of resistance.

Comparison of the structures of the cavitation zones obtained for different regimes of flow permitted making a conclusion about the determining role in the formation and development of cavitation structures of eddy type of the regime of flow in the boundary layer. The electrical effect leads to an increase in the integral noise intensity at the initial cavitation stage ($\lambda = 1.0$) and the stage for which the level of the signal is maximal ($\lambda = 1.75$). At 4/5

USSR

BOLOGA, M. K., PAUKOV, YU. N., TTYAN, S. A., BARSKIY, E. L., and LOPUKHOV, I. P., SIMPOZ PO FIZ AKUST-GIDRODINAM YAVLENIY, SUKHUMI, 1975 pp 196-191 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B763]

the remaining stages the effect of the current decreases the fixing signal.

VLASOV, YE. V. and GINEVSKIY, A. S.

AN EXPERIMENTAL STUDY OF THE INFLUENCE OF ACOUSTIC PERTURBATIONS ON THE
ONSET OF TURBULENCE IN A BOUNDARY LAYER

Novosibirsk PRISTENNOYE TURBULENTNOYE TECHENIYE [Turbulent Flow Near a Wall,
Collection of Works] in Russian Part 2, 1975 pp 232-242

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B120 by
V. Ya. Levchenko]

[Text] The paper presents the results of an experimental study of the boundary layer in longitudinal flow around a cylinder 500 mm in diameter and 1800 mm long at Reynolds numbers $(1.26-5.22) \cdot 10^6$. The cylinder is located in the acoustic field produced by emission of sound in directions perpendicular to the flow. The frequency of the sound was varied over a range of 100-3200 Hz, and the level of acoustic pressure at the point of location of the model was 90-130 dB. The onset of transition to turbulent flow in the boundary layer in the absence of acoustic perturbations corresponded to Reynolds numbers $(1-1.46) \cdot 10^6$ depending on the flow velocity.

It is found that the range of frequencies of the acoustic field where an appreciable reduction in the transition Reynolds number is observed
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USSR

VLASOV, YE. V. and GINEVSKIY, A. S., PRISTENNOYE TURBULENTNOYE TECHENIYE,
Part 2, 1975 pp 232-242

corresponds principally to the region of boundary layer instability relative to small perturbations. It is found in this connection that appreciable destabilization of the flow necessitates surpassing a certain threshold level of acoustic pressure which depends on the frequency of the sonic signal. The authors note a "sawtooth" response of the laminar boundary layer to acoustic emission of a pure tone: for fixed values of the flowrate and the level of acoustic pressure in one or more narrow frequency bands there was an abrupt increase in the amplitude of velocity pulsations in the boundary layer. This effect was smoothed out with emission of sound in a $1/3$ -octave frequency band, and vanished with emission of sound in a 1-octave band. Data are presented that characterize the influence of emitted sound intensity on the transition at fixed frequencies.

Based on the results of a special study of transition in the boundary layer on a flat plate it is concluded that the sound-induced shift of the transition is weakly dependent on the direction of the acoustic emission. References 6.

GRIGOLYUK, E. I. and KUZNETSOV, YE. B.

THE WAY A SPHERICAL SANDWICH SHELL WITH ATTACHED RIGID MASSES RESPONDS TO AN ACOUSTIC PRESSURE WAVE

Tomsk DINAMIKA UPRUGIKH I TVERDYKH TEL, VZAIMODEYSTVUYUSHCHIKH S ZHIDKOST'YU [Dynamics of Elastic and Solid Bodies Interacting with a Liquid, Collection of Works] in Russian, Tomsk University, 1975 pp 53-59

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V376 by Yu. N. Novichkov]

[Text] An investigation is made of the problem of the action of an acoustic wave with a plane front on a spherical sandwich shell containing two masses on linear springs. The construction has central symmetry. The initial equations for the shell are nonlinear equations based on assumption of the broken-line hypothesis for distribution of tangential displacements with respect to the thickness of the sandwich shell. The problem is solved by the method of finite differences and by the Kutta-Merson numerical integration technique. The pressure against the shell is represented in the form of three components: incident wave pressure, pressure of diffraction by the

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USSR

GRIGOLYUK, E. I. and KUZNETSOV, YE. B., DINAMIKA UPRUGIKH I TVERDYKH TEL, VZAIMODEYSTVUYUSHCHIKH S ZHIDKOST'YU, Tomsk University, 1975 pp 53-59

rigid stationary sphere, and radiation pressure caused by motion of the shell. The thin-layer theory is used for the latter component. As a result the authors find the distributions of displacements, accelerations of the shell and the masses, and the stresses in the shell as a function of time. It is noted that there are undesirable values of stiffnesses of the suspension for the masses where considerable accelerations of these masses are observed.

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PLATONOV, E. G.

INTEGRAL FORM OF EXTERNAL FORCES WHEN AN ACOUSTIC PRESSURE WAVE INTERACTS
WITH A CYLINDRICAL SHELL

Tbilisi TRUDY DESYATTOY VSESOYUZNOY KONFERENTSII PO TEORII OBOLOCHEK I PLASTIN,
KUTAISI, 1975 [Works of the Tenth All-Union Conference on the Theory of Shells
and Plates, Kutaisi, 1975] in Russian, "Metsniyereba," 1975 pp 310-316

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V377 by
A. G. Gorshkov]

[Text] A new form of solution is proposed for the known problem of dif-
fraction of a plane nonstationary acoustic pressure wave by an infinitely
long elastic cylindrical shell immersed in an ideal compressible fluid.
The wave front is parallel to the axis of the shell (plane problem). The
potential of disturbed motion of the fluid satisfies the wave equation.

Principal attention is given to the problem of finding external hydro-
dynamic forces (transfer functions) acting on the surface of the shell.
The method of integral transformations is used for this purpose (Laplace
transformation with respect to time, and cosine-Fourier transformation with

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USSR

PLATONOV, E. G., TRUDY DESYATTOY VSESOYUZNOY KONFERENTSII PO TEORII OBOLOCHEK
I PLASTIN, KUTAISI, 1975, "Metsniyereba," 1975 pp 310-316

respect to angular coordinate). The method of asymptotic equivalent func-
tions is used in inverting the image of the transfer function. As an
example, curves are given for the pressure distribution on a rigid sta-
tionary cylinder when an isolated shock wave flows around it. The results
of the calculations agree with experimental data.

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ZHILIN, YU. L.

SOME PARTICULARS IN THE PROPAGATION OF AN ACOUSTIC SHOCK IN AN INHOMOGENEOUS ATMOSPHERE

UCHENYYE ZAPISKI TSENTRAL'NOGO AERO-GIDRODINAMICHESKOGO INSTITUTA [Scientific Annals of the Central Aerohydrodynamics Institute] in Russian Vol 6, No 4, 1975 pp 21-30

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 2, 1976 Abstract No 2B219 (résumé)]

[Text] Conditions are formulated under which the area of the ground surface subject to the action of a sonic boom from steady-state aircraft flight may be bounded, multiply connected or unbounded, while separate sections of the area are hit by repeated sonic booms. It is shown that in studying the geometry of the area consideration must be taken of a layer of atmosphere with thickness of the order of at least 2-3 times the flight altitude of the aircraft. It is also shown that the problem of determining the transverse dimensions of the area in the geometric acoustics approximation is incorrect in the general case since slight changes in the distribution of atmospheric factors may make considerable changes in the width of the area.

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USSR

DUNINA, T. A., YEGEREV, S. V. and NAUGOL'NYKH, K. A.

ON ACOUSTICOPTICAL CAVITATION

Moscow SIMPOZ PO FIZ AKUST-GIDRODINAM YAVLENIY, SUKHUMI, 1975 [Symposium on the Physics of Acoustical-Hydrodynamic Phenomena, Sukhumi, 1975, Collection of Works] in Russian, Izd-vo Nauka, 1975 pp 98-100

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B765 by V. A. Krasil'nikov]

[Text] Experiments were conducted on studying the thermal mechanism of sound generation in the focusing of radiation from a pulsed solid-state laser in water with energy of the light pulse of $E = 0.1$ J and a duration of $\tau = 0.2$ ms; a piezoceramic sensor registered the acoustical signal. Sound generation was studied during optical breakdown in water when $E = 0.6$ J and $\tau = 20$ ns. Breakdown began during the focusing of the optical pulses with $E = 0.6$ J. The compression wave was registered by a wide-band receiver; at a distance of 1.7 cm from the spark the shock wave had a sudden pressure jump $p \approx 150$ at for $E = 0.6$ J. Theoretical discussions given by the authors give $p = 130$ at.

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USSR

KRUTETSKIY, I. V., BEN'YAMINOVICH, M. B. and KONDRATOVICH, K. A.

TOWARD THE QUESTION OF AN EXPERIMENTAL DETERMINATION OF THE ENERGY OF ACOUSTICAL RADIATION DURING THE CONTACT OF CAVITATION BUBBLES

Moscow SIMPOZ PO FIZ AKUST-GIDRODINAM YAVLENIY, SUKHUMI, 1975 [Symposium on the Physics of Acoustical-Hydrodynamic Phenomena, Sukhumi, 1975, Collection of Works] in Russian, Izd-vo Nauka, 1975 pp 139-142

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B252 by O. K. Rozanov]

[Text] The authors theoretically examine the question of the possible values of the coefficient of transformation used in computing the characteristics of noise of bubble cavitation. By the coefficient of transformation η they mean the ratio of energy of acoustical radiation to the total energy of the bubble. They analyze the experimental results of a number of papers by domestic and foreign authors in which substantially different values of η are found under similar conditions of making the measurements ($\eta = 0.3-0.5$ in some papers and 10^{-3} in others). In qualitative

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USSR

KRUTETSKIY, I. V., BEN'YAMINOVICH, M. B. and KONDRATOVICH, K. A., SIMPOZ PO FIZ AKUST-GIDRODINAM YAVLENIY, SUKHUMI, 1975, pp 139-142 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B252]

form they examine the conditions of formation of a divergent shock wave during the collapse of the bubble. They pay attention to the fact that a certain minimal value of pressure in the unperturbed current must exist at which the contact of the bubbles is accompanied by the emission of shock waves. They demonstrate that for water this amount of pressure comprises about 1 at. They mention that in these papers where large values of η were obtained, the pressure in the unperturbed current reached 1-2 at. In other papers where η is about 10^{-3} the pressure was about 0.4 at. They emphasize that the dependence of η on the initial pressure imposes serious limitations on the possibility of modeling cavitation noise at low pressures. References 6.

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USSR

GONCHAROV, V. V.

STATIONARY PERTURBATIONS IN A FLUID CONTAINING GAS BUBBLES

Moscow SIMPOZ PO FIZ AKUST-GIDRODINAM YAVLENIY, SUKHUMI, 1975
[Symposium on the Physics of Acoustical-Hydrodynamic Phenomena,
Sukhumi, 1975, Collection of Works] in Russian, Izd-vo Nauka,
1975 pp 172-175

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B751
by V. A. Naletova]

[Text] The author examines weak perturbations in a fluid with gas bubbles. By allowing for nonlinearity only in the Rayleigh equation the author describes a system of equations of uniform isentropic flow of such a medium. He demonstrates that in linear approximation the solution to the system will be plane harmonic waves with dispersion caused by the presence of bubbles. Solution to the nonlinear system is sought in the form of a traveling wave when all parameters depend on the combination $x+ct$. Solution to the system of equations is described in implicit form and is investigated for various parameters of c . It is shown that the solution in the general case will be periodic, but the

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USSR

GONCHAROV, V. V., SIMPOZ PO FIZ AKUST-GIDRODINAM YAVLENIY, SUKHUMI, 1975, pp 172-175 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B751]

onset of solitons is possible. The author demonstrates that in the case of weak nonlinearity it is possible to write the explicit form of the solution of any type.

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KORTNEV, A.V., MAKAROV, V.K., SUPRUN, S.G., and KORTNEV, A.A.

THE CAVITATION THRESHOLD IN A PARTIALLY DEGASSED LIQUID

Moscow SIMPOZIUM PO FIZIKE AKUSTICHESKO-GIDRODINAMICHESKIKH YAVLENIY, SUKHUMI, 1975 [Symposium on the Physics of Acoustic-Hydrodynamic Phenomena; Sukhumi, 1975, Collection of Works] in Russian, Izd-vo Nauka, 1975 pp 75-79

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B662 by Ye.N. Lysov]

[Text] The acoustic cavitation threshold was measured in the focal area of a cylindrical magnetostriction converter ($f = 15$ kc) according to the appearance of the first subharmonic in the acoustic spectrum and cavitation erosion. Complete or partial degassing of the water samples was done in a special installation in which the air was extracted from the liquid under the influence of ultrasound at the pressure of saturated water vapor. The gas content of the investigated liquid samples was determined by the gas chromatography method, with 0.5 percent error at a reliability level of 0.99. In order to 1/2

KORTNEV, A.V., MAKAROV, V.K., et al., SIMPOZIUM PO FIZIKE AKUSTICHESKO-GIDRODINAMICHESKIKH YAVLENIY, SUKHUMI, 1975, Izd-vo Nauka 1975 pp 75-79

prevent the capture of cavitation nuclei before the determination of the threshold with dust particles from the atmosphere, measurements were taken from the surface of the measuring vessel for four different ways of filling it; these measurements were taken while it was being filled and before the main series of experiments was conducted. The highest threshold (16 atm) was provided by the fourth filling method, in which very rigorous measures were taken to isolate the test liquid from atmospheric air. For one of the liquid-charging methods, the threshold values were measured as functions of the liquids' gas content and the concentration of surface-active substances and electrolytes. The authors show that for low gas-content values, the presence of surface-active substances or electrolytes leads to lowering of the threshold; the higher the concentration of the solutions, the greater the lowering. As the gas content increases, the effect of surface-active substances decreases.

USSR

UKOLOV, A. T.

ON THE ACTIVE EXTINGUISHING OF SOUND IN LAMINAR WAVEGUIDES

Dolgoprudnyy TR XX NAUCH KONF MOSK FIZ-TEKH IN-TA, 1974. SER AERO-FIZ I PRIKL MAT, CH 1 [Works of the Twentieth Scientific Conference of Moscow Physico-Technical Institute, 1974. Series Aerophysics and Applied Mathematics, Part 1] in Russian, 1975 pp 104-107

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B238 by M. A. Inyakhina]

[Text] It was shown earlier that in a waveguide with a continuous medium the sonic wave outside the source of sound can be fully extinguished by using the receiving and radiating surfaces. In this work it is shown that an analogous system exists for active extinguishing of sound in the case of a laminar waveguide including multi-layer ones. The proof is valid also in the case when the speeds of sound in the layers are variable, when absorption exists in the media filling the waveguide and the walls of the waveguide, not being absolutely rigid, also possess absorption.

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USSR

UDC 629.78.015.4

LUKHANIN, V. YE., RYABCHENKO, V. M.

NONLINEAR CALCULATION OF SECTIONS OF A BODY FAR FROM ZONES OF GREAT
PERTURBATION

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI
LETATEL'N APPARATOV 1975 TEZISY DOKL in Russian Khar'kov 1975, pp 148-149

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No.
4.41.139 by S. G. Z.]

[Text] A study is made of the calculation of sections of a body far from zones of great perturbations with assigned combinations of normative external rupture forces, including temperature heating and internal excess pressure. The algorithm suggested is based on the method of calculation of closed thinwall rods using the hypothesis of planar distribution of full axial deformations in their transverse cross section. The dependences called the state diagrams of these elements are considered to be known in the calculated cross sections for longitudinal ribbed and sections of skin. The preliminary assignment of diagrams is possible if the stress-strain states of the corresponding elements are

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USSR

LUKHANIN, V. YE., RYABCHENKO, V. M., VSES KONF AVTOMATIZ ISSLED
NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975
TEZISY DOKL Khar'kov 1975, pp 148-149

monaxial or nearly so. However, for the bodies the stress-strain state of a significant portion of the sections of skin is essentially nonmonaxial. This requires modification of the method mentioned, which consists in introduction of certain simplifications to the model, related to the planar nature of the stress state in the areas of the calculated cross sections. This approach to the solution of the problem makes it possible using a procedure of successive approximations to determine the full set of parameters of the stress-strain state.

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USSR

UDC 629.78.015.4

VAKHITOV, M. B., SAFARIYEV, M. S., SAFONOV, A. S., GROSHKOVA, V. M.

SOFTWARE FOR CALCULATION OF THE LOAD-BEARING CAPACITY OF A THINWALL WING

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL in Russian Khar'kov 1975, pp 100-101

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.138 by A. V. U.]

[Text] The determination of the load-bearing capacity of a structure is performed by directed selection of levels of loading. The problem of determination of the stress is solved by successive approximations using the method of reduction coefficients. The theory of YU. G. Odínokov is used in its matrix version; at the same time, a hypothesis of rigid ribs is introduced, allowing the cumbersomeness of calculation to be reduced in comparison to the method of finite elements. In order to decrease the calculation time, a method of acceleration of the process is utilized involving introduction of "anticipation" to the

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USSR

VAKHITOV, M. B., SAFARIYEV, M. S., SAFONOV, A. S., GROSHKOVA, V. M., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL Khar'kov 1975, pp 100-101

intersecting moduli of elasticity of elements in each step. The software consists of a branched program written for the BESM-4 computer. Calculation of an eight-rib wing for limiting load requires 1.5 hr machine time.

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USSR

UDC 629.78.015.4

BRUSHKOVSKIY, A. L.

CONSTRUCTION OF STANDARDIZED ALGORITHMS FOR STRENGTH CALCULATION OF
GLUED, WELDED, RIVETED AND COMBINED JOINTS

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI
LETATEL'N APPARATOV 1975 TEZISY DOKL in Russian Khar'kov 1975, pp 178-179

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No.
4.41.134 by A. V. U.]

[Text] A method is presented for construction of standardized algorithms for determination of the stress-strain state and load-bearing capacity of permanent joints in the structures of flight vehicles. The primary bases of the method are the development of generalized requirements for algorithms, the introduction of a flexible classification of joints, the development of a design method for standardization within the limits of each class, analysis of joints as complex combined systems, efficient selection of additional unknowns and development of flexible algorithms for their determination.

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USSR

BRUSHKOVSKIY, A. L., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI
I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL Khar'kov
1975, pp 178-179

Algorithms are presented for designing glue, welded (with point and roller welding, with face and flange seams), riveted, glued-welded and glued-riveted joints.

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USSR

UDC 629.78.015.4

SHELOMOV, N. A., KHARUN, N. M.

THE RAKOS-2 PROGRAM COMPLEX

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL in Russian Khar'kov 1975, pp 186-187

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.132 by A. V. U.]

[Text] This complex of programs is intended for determination of the components of the stress-strain state of the load-bearing structures of a flight vehicle in the zone of variation of rigidity and application of local effects. The complex automatically synthesizes the problem in the form of a set of edge problems in ordinary derivatives. The solution is sought by methods of numerical integration by reduction to a Cauchy problem. This allows one to avoid the expansion of the functional unknowns into series and eliminates the need to study the convergence of the method. The complex performs the following operations:

- 1) determination of components of the stress-strain state at the

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SHELOMOV, N. A., KHARUN, N. M., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL Khar'kov 1975, pp 186-187

junctions of the system; 2) the same for an arbitrary point; 3) estimation of the strength of elements of the load-bearing structure; 4) estimation of the rigidity of elements of the load-bearing structure. Examples are presented of the design of specific products, the results are compared to experimental results and theoretical data.

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USSR

UDC 629.78.015.4

KERAS, V. K.

INCLUSION OF OPERATIONS RESEARCH METHODS IN THE APPARATUS OF STRENGTH CALCULATIONS UPON AUTOMATION OF PLANNING OF FLIGHT VEHICLES

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL in Russian Khar'kov 1975, pp 118-119

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.128 by S. G. Z.]

[Text] In the search for methods of better representation and analysis of information on the kinetics of deformation and unloading, a complex of strength calculations has been synthesized. This complex was based on a graph of the kinetics of deformed rupture. It consists of events which formally represent particular stable states of the deformed object, and operations which represent particular intervals of deformation-rupture -- processes of transition from one stable state to the next. A study is made of the construction of release of equivalent stresses, deformations or energies of a deformed object to map its state in the form of isolines on a plane. The sequence and necessity of equipping

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KERAS, V. K., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL Khar'kov 1975, pp 118-119

the arcs of the graph with time, energy and force characteristics as a function of the initial statement of the problem, the form of assigned strength criteria and the purpose of the solution of the strength problem are studied. It is shown that this method of mapping corresponds best to the nature of natural processes, consideration of the stochastic nature of loading and properties of the material. One method of realization of these methods by computer has been developed; in order to determine the operations, paths and critical paths of deformation and rupture, the same algorithm is used, formally similar to a dynamic programming algorithm. The complex described has been found effective in analysis of problems of deformation and rupture under stress concentration conditions.

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USSR

UDC 629.78.063.6.001

SHELOMOV, N. A., BUSHKOV, YU. YE.

THE "PROYEKT-STATIKA" COMPLEX OF PROGRAMS

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV in Russian 1975, TEZISY DOKL Khar'kov 1975, pp 194-195

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.120 by A. V. U.]

[Text] This complex of programs is intended for planning spatially strongly branched pipe ranges. External loads are considered to be all structures, considering accelerations during maneuvers, temperature, internal gauge pressure, kinematic effects due to external apparatus and forces. For an arbitrary three-dimensional curved element with assigned elastic axis, the geometric properties are established by the "Intertrossa" program, the rigidity characteristics are determined by numerical integration. The "Proekt-statika" complex is open, the present state must be looked upon as the first stage, including the

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USSR

SHELOMOV, N. A., BUSHKOV, YU. YE., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL Khar'kov 1975, pp 194-195

most general algorithms for the design of systems, the geometric properties of which are assigned tabularly.

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USSR

UDC 629.78.076.8

OKHOTSIMSKIY, D. YE., GOLUBEV, YU. F., SIKHARULIDZE, YU. G.

CONTROL ALGORITHMS FOR SPACE VEHICLES UPON REENTRY INTO THE ATMOSPHERE

ALGORITMY UPRAVLENIYA KOSMICHESKIM APPARATOM PRI VKHODE V ATMOSFERU
in Russian Moscow Nauka Press 1975, 400 pp

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract
No. 4.41.85 from the resume]

[Text] This monograph is dedicated to the problem of controlling the motion of a spacecraft upon reentry into the atmosphere (descent of a satellite from orbit, return from the moon or from an interplanetary flight). A study is made of multistep adaptive control algorithms functioning over a broad range of reentry velocities, from orbital to hyperbolic, with flight ranges over the reentry section of a few hundred to $10\text{--}12 \cdot 10^3$ km. The algorithms developed assure complete utilization of the reentry corridor, high accuracy of landing position, low consumption of fuel for control, minimal requirements for control torque and conservation of operating ability with significant

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USSR

OKHOTSIMSKIY, D. YE., GOLUBEV, YU. F., SIKHARULIDZE, YU. G., ALGORITMY
UPRAVLENIYA KOSMICHESKIM APPARATOM PRI VKHODE V ATMOSFERU Moscow
Nauka Press 1975, 400 pp

perturbations. The algorithms place moderate requirements on the on-board computer and allow the transition to practical realization. The methods developed go beyond the framework of the problem solved; they may be useful in a number of motion control problems. The monograph is intended for specialists in the area of control of spacecraft and other moving objects, graduate students and senior students in physical-mathematical and technical specialties. 123 figures; 15 tables; 121 references.

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USSR

UDC 621.43.011:533;621.5:533

KOZLOVA, N. G. and POLYAKOV, V. V.

EXPERIMENTAL INVESTIGATION OF THE REGION OF INTERACTION OF A SUPERSONIC REACTIVE JET WITH A SUBSONIC EXTERNAL FLOW

[TRUDY] MOSKOVSKOGO AVIATIONNOGO INSTITUTA [(Works) of Moscow Aviation Institute] in Russian No 329, 1975 pp 87-96

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B965 by T. A. Girshovich]

[Text] The paper presents the results of an experimental study of the near wake of a flight vehicle in the presence of a reactive jet. The study was done in a short-action wind tunnel at high subsonic Mach numbers. In the process of the experiment over a wide range of variation in the degree of nonideality of the reactive jet discharge the authors measured the fields of total and static pressures and obtained Töpler schlieren patterns of the shadow of flow around the model. In addition, qualitative studies were done by visualization of the flow using an oil coating of the surface of a plate installed in the base region. The study was done to refine the physical

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USSR

KOZLOVA, N. G. and POLYAKOV, V. V., TRUDY MOSKOVSKOGO AVIATIONNOGO INSTITUTA, No 329, 1975 pp 87-96

pattern of the flow in the base region: qualitative, and to some extent quantitative definition of the circulation zone, region of merging of flows, longitudinal and transverse pressure gradients, and also the location of the cross section where the static pressure is equal to the ambient pressure. References 5.

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USSR

UDC 533.697

ZAKHAROV, V. D.

A METHOD OF CALCULATING THE THRUST CHARACTERISTICS OF JET NOZZLES

[TRUDY] MOSKOVSKOGO AVIATIONNOSTROITELNOGO INSTITUTA [(Works) of Moscow Aviation Institute] in Russian No 329, 1975 pp 80-87

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B922 by A. S. Malyutin]

[Text] A method is given for determining the thrust and flowrate characteristics of a jet nozzle with hourglass shell. The flow model assumes motion by primary and secondary flows of supersonic velocities in the outlet section of the shell. The mixing zone and the boundary layer at the wall do not merge within the limits of the nozzle. An equation is presented that enables one to determine the value of the reduced coefficient of ejection for a nozzle of given geometry from the ratio of the total pressures of the primary and secondary flows. The coefficient of thrust is defined as the ratio of axial momentum of the primary and secondary flows and excess pressure force in the outlet section to the ideal momentum of the primary flow in the same section. Consideration is taken of the reduction in momentum due to flow misalignment in the outlet section of the nozzle.

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USSR

ZAKHAROV, V. D., TRUDY MOSKOVSKOGO AVIATIONNOSTROITELNOGO INSTITUTA No 329, 1975 pp 80-87

Applicability of the method to calculation of thrust and flowrate characteristics is illustrated by excellent agreement between theoretical and experimental relations over a fairly wide range of variation in geometric parameters of investigated nozzle models. References 5.

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PONOMAREVA, L. V. and NASONOVA, G. I.

DYNAMICS OF A DOUBLE-PARACHUTE SYSTEM IN THE VERTICAL PLANE IN THE WIND

Moscow TRUDY DEVIATYKH CHTENIY, POSVYASHCHENNYKH RAZRABOTKE NAUCHNOGO NASLEDIYA I RAZVITII IDEY K. E. TSIOLKOVSKOGO, KALUGA, 1974. SEKTSIYA 'AVIATSIYA I VOZDUKHOPPLAVANIYE' [Works of the Ninth Readings Dedicated to Development of the Scientific Heritage and Elaboration of the Ideas of K. E. Tsiolkovskiy. Aviation and Aeronautics Section] in Russian, 1975 pp 65-73

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B907 by G. S. Aronin]

[Text] Equations are derived that describe the motion of a double parachute system in the vertical plane in the presence of wind after the parachutes have opened completely. It is assumed that after opening the parachutes behave as solids, the suspension system is inextensible, the shroud line of each parachute coincides with its axis of symmetry, all acting forces lie in a single plane. Consideration is taken of the presence of wind, the altitude dependence of its horizontal averaged velocity being described by a power-law formula, while horizontal pulsations are described by the sum of

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PONOMAREVA, L. V. and NASONOVA, G. I., TRUDY DEVIATYKH CHTENIY, POSVYASHCHENNYKH RAZRABOTKE NAUCHNOGO NASLEDIYA I RAZVITII IDEY K. E. TSIOLKOVSKOGO, KALUGA, 1974. SEKTSIYA 'AVIATSIYA I VOZDUKHOPPLAVANIYE,' 1975 pp 65-73

harmonic functions, and vertical pulsations are described by a function of damped oscillations. The results of numerical solution of the derived system of second-order nonlinear differential equations with seven unknowns (coordinates of the center of mass of the load, angles of deflection from the vertical and forces of tension in the shroud lines, angle of inclination of the axis of symmetry of the load away from the vertical) are not presented, but it is stated that they agree satisfactorily with experimental data.

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VYSKREBENTSEV, L. I.

CONSTRUCTION OF REGIONS OF DAMPING OF THE TRANSIENT PROCESS WITH RESPECT TO ANGLE OF ATTACK $\Delta\alpha$ WITH FLIGHT OF AN AIRCRAFT ON STAGES OF MOTION THAT ARE UNSTEADY WITH RESPECT TO VELOCITY

[TRUDY] TASHKENTSKOGO POLITEKHNICHESKOGO INSTITUTA [(Works) of Tashkent Polytechnical Institute] in Russian No 137, 1974 pp 3-8

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B893 by G. S. Aronin]

[Text] An examination is made of short-period motion of an aircraft with respect to angle of attack in the case of unsteady flight speed. A second-order homogeneous linear differential equation is derived with variable coefficients and assumptions as to smallness of the angle of attack and inclination of the trajectory, linearity of the change in velocity with respect to time and small change in Mach number and flight altitude on a short time interval (no more than 10-15 s). Solutions are given for the differential equation in quadratures by means of degenerate hypergeometric functions (separate for acceleration and deceleration). Conditions are derived that

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VYSKREBENTSEV, L. I., TRUDY TASHKENTSKOGO POLITEKHNICHESKOGO INSTITUTA, No 137, 1974 pp 3-8

ensure damping of short-period motion and enable construction of the boundaries of motion stability in the plane of parameters compiled from three coefficients of the initial differential equation.

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MITROSHIN, E. I., YELISEYEV, V. D., VASIL'YEV, V. A. and GLINSKIY, V. A.

SOME PROBLEMS OF STOCHASTIC CONTROL OF A FLIGHT VEHICLE TRAJECTORY

[TRUDY] MOSKOVSKOGO AVIATIONNOGO INSTITUTA [(Works) of Moscow Aviation Institute] in Russian No 330, 1975 pp 21-27

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B892 by G. S. Aronin]

[Text] An examination is made of a possible approach to the problem of stochastic control of the three-dimensional trajectory of motion of a flight vehicle to a given terminal point in the presence of perturbations due to turbulence and fluctuations of atmospheric density and random errors in measurement of the vector of state of the vehicle. The control problem is taken as minimization of the average risk. A flowchart of the control system is proposed that realizes a principle of stochastic equivalence. For the special case of equilibrium gliding the authors present analytical solutions of the equations of motion that are used as program relations for realization of control on a high-speed digital computer. The measured vector of state includes velocity, angle of inclination of the trajectory and course,

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MITROSHIN, E. I., YELISEYEV, V. D., VASIL'YEV, V. A. and GLINSKIY, V. A., TRUDY MOSKOVSKOGO AVIATIONNOGO INSTITUTA, No 330, 1975 pp 21-27

altitude, and longitudinal and lateral range to the given terminal point; control is implemented by alterations of angle of attack and roll. A simplified method of control correction is proposed that is based on a modification of the method of proportional navigation. An example of a three-dimensional trajectory obtained in modeling is presented. Analysis showed that the proposed system ensures predetermined control precision. It is noted in the conclusion that in view of the appreciable nonlinearity of equations of motion it is advisable to find the information on vehicle control on the basis of measurements of the vector of state by using an expanded Kalman filter. References 6.

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USSR

UDC 533.652/.661.013

YELISEYEV, V. D. and GLINSKIY, V. A.

TERMINAL CONTROL OF THE TRAJECTORY OF MOTION OF A FLIGHT VEHICLE WITH INTEGRAL LAW

[TRUDY] MOSKOVSKOGO AVIATSIONNOGO INSTITUTA [(Works) of Moscow Aviation Institute] in Russian No 330, 1975 pp 32-36

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B891 by G. S. Aronin]

[Text] An examination is made of the problem of terminal control to bring a flight vehicle to a point in space determined by finite altitude, longitudinal and lateral ranges and course angle. The control is constructed on the basis of tracking programmed relations, and is implemented by alterations of the angle of attack and roll (the angle of attack is limited from above and from below). The control law in the longitudinal plane formed by the velocity vector in a half-velocity coordinate system consists in tracking the programmed values of the vertical g-force and angular velocity of rotation of the sighting line. Two integral laws of control of the lateral g-force were studied for controlling motion in the lateral plane. The

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USSR

YELISEYEV, V. D. and GLINSKIY, V. A., TRUDY MOSKOVSKOGO AVIATSIONNOGO INSTITUTA, No 330, 1975 pp 32-36

most advisable of the two is ascertained, giving less sensitivity of the final course error to selection of the amplification factor, and a lower probability of carrying maneuvers to the limit.

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USSR

UDC 533.652/.661.013

YEFREMOV, A. V.

INVESTIGATION OF THE DYNAMICS OF AIRCRAFT FLIGHT AT LOW ALTITUDES UNDER
CONDITIONS OF ATMOSPHERIC TURBULENCE

[TRUDY] TASHKENTSKOGO POLITEKHNICHESKOGO INSTITUTA [(Works) of Tashkent Poly-
technical Institute] in Russian No 137, 1974 pp 11-15

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B885 by G. S.
Aronin]

[Text] A comparison is made of the mean square values of g-forces due to
atmospheric turbulence as calculated by the Karman and Dryden models of the
atmosphere. Satisfactory agreement of the results throughout the range of
dynamic characteristics of an aircraft shows the feasibility of using the
Dryden model, which is simpler and can be used to get an analytical expres-
sion for the mean square g-force, whereas a computer is needed with the
Karman model.

An expression is presented for variance of flight altitude in a turbu-
lent atmosphere with an ideal autopilot equipped with sensors for g-force,
angular pitch velocity, flight altitude, vertical velocity and pitch angle.

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USSR

YEFREMOV, A. V., TRUDY TASHKENTSKOGO POLITEKHNICHESKOGO INSTITUTA, No 137,
1974 pp 11-15

Analysis shows that flight in disturbed air is not an engineering case for
selecting the transfer number of an autopilot with respect to altitude.

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DYBAN, YE. P. and EPIK, E. YA.

MICROSTRUCTURE OF BOUNDARY LAYERS AND PROCESSES OF TRANSFER IN THEM IN THE CASE OF ELEVATED EXTERNAL FLOW TURBULENCE

Novosibirsk PRISTENNOYE TURBULENTNOYE TECHENIYE [Turbulent Flow Near a Wall, Collection of Works] in Russian Part 2, 1975 pp 30-42

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B143 by L. M. Zysina-Molozhen]

[Text] The paper gives the results of an experimental study of the action of turbulence of the external flow on the structure of the boundary layer that arises with longitudinal flow around a plate in a wind tunnel with controllable degree of flow turbulence over a range $Tu = 0.3-26\%$. The experiments were done at velocities $V_\infty = 0.88$ and 9.06 m/s at distances from the leading edge of the plates $x = 0.105$ and 0.340 m over a range of variation in Reynolds numbers $Re = (6-210) \cdot 10^3$. The characteristics of flow turbulence were measured by the DISA-55 hot-wire anemometer.

Curves that are given show the action of turbulence on deformation of velocity profiles in the boundary layer, change in the tangential friction

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USSR

DYBAN, YE. P. and EPIK, E. YA., PRISTENNOYE TURBULENTNOYE TECHENIYE, Part 2, 1975 pp 30-42

stresses, the form parameter $H = \delta^*/\delta^{**}$, the intensity of pulsations and longitudinal scales of turbulence crosswise of the boundary layer. The variation of parameters is nonmonotonic, and is observed in both a laminar and turbulent boundary layer. The authors introduce the concept of a pseudo-laminar boundary layer that exists in the case of high turbulence of the external flow and is characterized by low values of $H = 1.9$ and a coefficient of friction elevated by a factor of approximately 1.5.

Data are presented on the intensification of heat exchange at the leading critical point in the case of transverse turbulized flow around a cylinder. References 21.

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KUZNETSOV, A. V., and SAYKIN, S. S.

INVESTIGATION OF THRUST BY AN UNSTEADY GROUND-EFFECT JET

TRUDY SEMINARA PO KRAYEVYM ZADACHAM. KAZANSKIY UNIVERSITET [Works of the Seminar on Boundary-Value Problems. Kazan' University] in Russian No 12, 1975 pp 134-140

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B11 by V. V. Krylov]

[Text] An examination is made of the plane problem of symmetric flow of a jet of ideal incompressible and weightless fluid against a flat screen in the case where the velocity of the fluid in the nozzle depends on time at a sufficiently great distance from the tip. Perturbed flow of the fluid is taken as potential, and the Gurevich-Haskind linearized condition is assumed on the free boundary.

Integral Laplace transformation is applied to the velocity potential and boundary conditions, and then the image of the complex potential is found from the Keldysh-Sedov formula. To determine the arbitrary functions appearing in the integration result the authors make use of the condition of

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KUZNETSOV, A. V. and SAYKIN, S. S., TRUDY SEMINARA PO KRAYEVYM ZADACHAM. KAZANSKIY UNIVERSITET, No 12, 1975 pp 134-140

boundedness of the fluid velocity in the flow region. Inversion formulas are used to find an analytical expression for the force of ground-effect interaction of the jet.

For the two special cases of linear and exponential time dependence of velocity, graphs are given for the change in the ground-effect interaction with different relative distances between the nozzle tip and the screen.

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USSR

MERZLYAKOV, V. D.

STABILITY OF FLAT MOTION OF AIRCRAFT ACCORDING TO ANGULAR COORDINATES

Tomsk MATERIALY 5-Y NAUCH KONF PO MAT I MEKH. TOMSK UN-T. T 2
[Materials from the Fifth Scientific Conference on Mathematics and Mechanics. Tomsk University. Vol 2, Collection of Works] in Russian, Izd-vo Tomsk University, 1975 p 179

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1202]

[Text] For investigation of stability the author uses a model of flat motion of a solid body passing through the effect of the force of frontal resistance, lifting force and force of gravity. He assumes that the motion relative to the center of masses takes place under the effect of stabilizing and damping moments. The lifting force and the stabilizing moment are assumed to be linear functions of the angle of attack, the force of frontal resistance is examined as a nonlinear function of the angle of attack, the damping moment is presented in the form of a linear function of angular velocity. The aerodynamic coefficients of the forces and moments are examined as continuous unique functions of the Mach number.

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USSR

MERZLYAKOV, V. D., MATERIALY 5-Y NAUCH KONF PO MAT I MEKH. TOMSK UN-T. T 2, 1975 p 179 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1202]

From the system of equations describing the motion of the center of masses in a flow system of coordinates and the motion relative to the center of masses in an associated system of coordinates, the author finds differential equations which describe the change in angle of attack, angle of tangency and angle of the velocity vector of the center of masses. For the first this is an ordinary differential equation of the second order of magnitude with variable coefficients, for the second and third these are equations of the third order of magnitude.

Using the asymptotic method the author finds the dependences on path of the angle of attack, derived in time from the angle of tangency and angular velocity of the velocity vector of the center of masses. In analyzing these dependences he finds the conditions

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USSR

MERZLYAKOV, V. D., MATERIALY 5-Y NAUCH KONF PO MAT I MEKH. TOMSK UN-T. T 2, 1975 p 179 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1202]

which associate the aerodynamic, mass and geometric characteristics of the aircraft, satisfaction of which ensures asymptotic stability of motion over the angular coordinates. Author's abstract.

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USSR

UDC 629.78.001

TRILESSKIY, M. L.

SOME PROBLEMS OF THE DESIGN AND REPRODUCTION OF FLIGHT VEHICLE SURFACES

[TR] TASHKENT POLITEKHN IN-TA in Russian 1974, No. 137 pp 39-43

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.118 by A. V. U.]

[Text] In order to reproduce the contours of vehicles, it is suggested that tables of finite differences be used. This corresponds to approximation of the contour by a polynomial, and there is no need to determine the coefficient and write it in explicit form. The monotonic nature of changes in differences of higher orders can be used to judge the smoothness of the primary body and eliminate errors made. Interpolation at the beginning and end of the table can be performed using the formulas of Newton, in the middle of the table -- formulas with central differences (the formulas of Gauss, Stirling, Bessel and Everett). As practice has shown, the overwhelming majority of curves forming the frames of surfaces can be approximated by polynomials of up to fourth power, that is differences up to fourth order.

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USSR

MATYAZH, A. I.

PARAMETRIC INVESTIGATIONS OF THE MEANS FOR MECHANIZING THE NOSE OF A WING FOR THE PURPOSE OF RAISING THE SAFETY COEFFICIENT OF LIFTING POWER OF CIVIL AIRCRAFT

Kazan' TR KAZAN AVIATS IN-TA [Works of Kazan' Aviation Institute] in Russian, No 190, 1975 pp 3-8

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1193]

[Text] The following three types of mechanization of the leading edge of a wing were studied in a wind tunnel on the segment of a wing equipped with a three-slot flap: a Krueger split flap, a slat and a deflecting nose.

The author establishes that the effect of mechanizing the leading edge to a significant degree is determined by the position of the mechanization on the trailing edge.

He obtains material of a systematic character which permits comparing the effectiveness of the means of mechanization of the leading edge of the wing and demonstrates the optimal angles of their deflection.

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USSR

MATYAZH, A. I., TR KAZAN AVIATS IN-TA, No 190, 1975 pp 3-8 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1193]

He establishes that the mechanization of the leading edge permits raising the values of the safety coefficient of lifting force of the wing. Author's abstract.

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USSR

TITARENKO, V. V.

USE OF THE METHOD OF DEFORMED COORDINATES FOR INVESTIGATING SEVERAL SELF-MODELING PROBLEMS OF SHOCK WAVE INTERACTION

Saratov DIFFERENTS URAVNENIYA I VYCHISL MAT. VYP 5, CH 2 [Differential Equations and Computer Mathematics, No 5, Part 2, Collection of Works] in Russian, Izd-vo Saratov University, 1975 pp 131-141

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B218]

[Text] The author examines self-modeling problems of shock wave interaction containing a certain small parameter. For elimination of the defects of linear theory he develops a method of deformed coordinates with an accuracy to small values of second order of magnitude inclusively which permits investigating two-dimensional non-steady-state potential flows behinds the fronts of the lines of weak fracture and weak shock waves propagating in the general case by uniform flows. He discusses the role of the third and subsequent approximations. As examples he examines problems of interaction of a weak shock wave with the surface of a moving half-plane,

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USSR

TITARENKO, V. V., DIFFERENTS URAVNENIYA I VYCHISL MAT. VYP 5, CH 2, 1975 pp 131-141 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B218]

diffraction and Mach reflection of a shock wave of arbitrary intensity from a wall with a small rectilinear discontinuity and others. References 9. Author's abstract.

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KOROLEVA, G.A.

CALCULATING THE PARAMETERS OF THE SONIC SHOCK FROM A SUPERSONIC AIRPLANE WITH DUE CONSIDERATION FOR THE SECOND APPROXIMATION

TRUDY NII GRAZHDANSKOY AVIATSII [Works of the Scientific Research Institute of Civil Aviation] in Russian No 117 1975 pp 33-40

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 4V406 by G.S. Aronin]

[Text] On the basis of a previously advanced theory (see Landahl, Ryhming, and Kilding, "Nonlinear Effects on Sonic Boom Intensity," NASA, 1968, No SP-180), the author evaluates the nonlinear effects of the sonic boom from modern supersonic airplanes. When calculating the parameters of the sonic shock, she replaces the aircraft configuration with an equivalent body of revolution. She discusses a schematized configuration that includes a fuselage consisting of nose and tail sections with parabolic generatrices and a cylindrical middle section plus a triangular wing with subsonic leading edges. Wing and fuselage interference are not taken into consideration, and the
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KOROLEVA, G.A., TRUDY NII GRAZHDANSKOY AVIATSII, No 117 1975 pp 33-40

distribution of lift along the wing's length is assumed to be uniform. The author made calculations for an airplane with dimensions and weight close to those of the first version of the TU-144, for cruising flight at $M = 2$ at an altitude of 18,000 m and climbing and descending at $M = 1.3$ at 13,000 m. A comparison of the calculations made according to the theories of the first and second approximation indicate the necessity of allowing for nonlinear effects when calculating the intensity and location of the shock waves caused by the wing. References 9.

LUKASHCHUK, S.A., TRUBENOK, V.D., and FRIDLAND, V.YA.

AN INVESTIGATION OF THE VELOCITY FIELD IN THE VICINITY OF A VORTEX FORMER

Kiev SBORNIK NAUCHNYKH TRUDOV KIEVSKOGO INSTITUTA INZHENEROV GRAZHDANSKOY AVIATSII [Collection of Scientific Works From the Kiev Institute of Civil Aviation Engineers] in Russian No 5 1969 pp 93-97

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B1171 by A.V. Krasil'nikov]

[Text] The authors investigate the velocity field in the vicinity of a vortex former that is a rectangular recess (with various geometric dimensions) in a flat plate that is mounted parallel to the flow in a wind tunnel where the air flow rate is 30-35 m/sec. Velocity measurements were taken at 15 points in the boundary layer. The displacement and momentum thicknesses and their ratio were computed during the processing of the experimental results. It was discovered that the effect of vortex formers is manifested at distances exceeding their lateral dimensions by a factor of 20-25. Vortex formers increase the "filling" of the velocity epures, and thereby stabilize
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LUKASHCHUK, S.A., TRUBENOK, V.D., et al., SBORNIK NAUCHNYKH TRUDOV KIEVSKOGO INSTITUTA INZHENEROV GRAZHDANSKOY AVIATSII, No 5 1969 pp 93-97

the current in the turbulent boundary layer by pushing away the disruptive conditions in the gradient currents. The displacement thickness can be reduced inside the vortex former's zone of influence; that is, the value of the tangential friction stresses can be reduced. References 5.

USSR

UDC 621.43.011:533;621.5:533

GINZBURG, I.P., SOKOLOV, YE.I., and USKOV, V.N.

INVESTIGATION OF THE CURRENT IN UNDEREXPANDED COAXIAL COUNTERFLOWS

Leningrad UCHENYYE ZAPISKI LGU [Scientific Notes From Leningrad State University] in Russian No 384 1975 pp 112-122

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B1124 (resume)]

[Text] The authors discuss the qualitative picture and characteristic geometric parameters of underexpanded coaxial counterflows for a wide range of discharge parameters. The analysis of shliren [Schlieren] photographs enabled them to establish possible current arrangements in the counterflows and the area of their existence. They obtained a single automodeling parameter for the case of the flows' interaction with the first rolls, as well as empirical formulas relating the location of the shock waves and interface with the current parameters. The authors propose a method for determining the position of the central compression waves and the interface in the counterflows that utilizes the obtained empirical formulas and the conditions of equality of the Pitot pressures on the interface. The method is illustrated by calculative examples. References 11.
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USSR

UDC 621.43.011:533;621.5:533

AL'BITSKIY, A.A.

EFFECT OF THE GEOMETRIC PARAMETERS OF AN AXIAL REGISTER ON THE FORMATION OF A FREE TWISTED FLOW

GIDROMEKHANIKA. RESPUBLIKANSKIY MEZHVEDOMSTVENNYY SBORNIK [Hydromechanics; Republic Interdisciplinary Collection of Works] in Russian No 32 1975 pp 93-97

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B1125 (resume)]

[Text] The author presents the results of an experimental investigation of free, twisted air flows created by nozzles with axial vaned registers. The distribution of velocities and static pressure in the flows was obtained for different values of the registers' geometric parameters at $Re = (0.94-1.65) \cdot 10^5$. The author shows that, in addition to the twist angle, the register's coupling ratio plays an important role in the formation of the flow.

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LUKASHCHUK, S.A., and FRIDLAND, V.YA.

RESEARCH IN THE EFFECT OF VORTEX FORMERS ON THE LIFT EFFICIENCY OF A SUPERSONIC PROFILE

Kiev SBORNIK NAUCHNYKH TRUDOV KIEVSKOGO INSTITUTA INZHENEROV GRAZHDANSKOY AVIATSII [Collection of Scientific Works From the Kiev Institute of Civil Aviation Engineers] in Russian No 5 1969 pp 87-92

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B1062 by A.V. Krasil'nikov]

[Text] In a wind tunnel with an air flow rate of 42-45 m/sec, the authors investigated a double-wedge profile of ninth percentile thickness that had a sharp leading edge, a slotted flap, and a leading-edge flap. They used three flaps: a smooth one and two flaps with different degrees of ribbing. The flap's angles of attack and deviation and the leading-edge flap's angle of deviation were changed within limits of 0-15°, 30-60°, and minus 15° to 0°, respectively. During the experiments the authors measured the pressure distribution along the profile, which they then used to compute 1/2

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USSR

LUKASHCHUK, S.A., and FRIDLAND, V.YA., SBORNIK NAUCHNYKH TRUDOV KIEVSKOGO INSTITUTA INZHENEROV GRAZHDANSKOY AVIATSII, No 5 1969 pp 87-92

the lift coefficients. The investigations showed that stabilization of an uninterrupted flow-past of a flap is possible at high deviation angles (up to 55-60°) if vortex formers (ribbing) are installed. The magnitude of the effect caused by installation of the vortex formers depends heavily on the coordinate of the beginning of the ribbed surface. A leading-edge flap has a large effect on the effectiveness of the vortex-forming surface.

USSR

UDC 533.69.011

MKHITARYAN, A.M., MAKSIMOV, V.S., and LAZNYUK, P.S.

ON THE QUESTION OF THE EFFECT OF A FLAP'S POSITION RELATIVE TO THE
AXIS OF THE BLOWING JET ON THE EFFECTIVENESS OF BLOWOFF

Kiev SBORNIK NAUCHNYKH TRUDOV KIEVSKOGO INSTITUTA INZHENEROV GRAZH-
DANSKOY AVIATSII [Collection of Scientific Works From the Kiev Insti-
tute of Civil Aviation Engineers] in Russian No 5 1969 pp 14-21

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B1068
by G.S. Aronin]

[Text] The authors describe the techniques used and present the re-
sults of an experimental investigation of the effect on blowoff effi-
ciency of the flap's position relative to the axis of the jet blowing
onto its upper surface. The experiments were conducted on a model of
a rectangular wing with a supersonic profile that had a leading-edge
flap and an unslotted flap and was blown from the trailing edge of
the wing. Blowoff efficiency was estimated according to the value of
momentum factor necessary to eliminate separation. The dependence of
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USSR

MKHITARYAN, A.M., MAKSIMOV, V.S., et al., SBORNIK NAUCHNYKH TRUDOV
KIEVSKOGO INSTITUTA INZHENEROV GRAZHDANSKOY AVIATSII, No 5 1969 pp
14-21

the lift coefficient on the flap's angles of attack and deviation
was determined from the results of pressure distribution measurements.
The Reynolds number was $1.2 \cdot 10^6$. The results of the tests showed
that moving the flap upward while maintaining the same deviation
angle leads to an increase in the lift gain created by it.

USSR

UDC 621.43.011:533;621.5:533

VALECHIK, L.A.

TURBULENT CHARACTERISTICS OF AN AXIALLY SYMMETRIC JET INTERACTING
WITH A NEARBY SCREEN

Kiev SBORNIK NAUCHNYKH TRUDOV KIEVSKOGO INSTITUTA INZHENEROV GRAZH-
DANSKOY AVIATSII [Collection of Scientific Works From the Kiev Insti-
tute of Civil Aviation Engineers] in Russian No 5 1969 pp 49-56

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B1122
(resume)]

[Text] The author discusses the vertical distribution of the compo-
nents, pulsation velocities, and other characteristics of the main
section of the boundary layer created by blowoff of an axially sym-
metric jet from a circular nozzle onto a flat screen at an angle of
90°. All of the measurements were made with an ETAM-ZA hot-wire ane-
mometer. In connection with this, single-filament probes were used
to measure the longitudinal and transverse components. In the second
case the probe was an angular one, which made it possible to measure
transverse pulsations in a thin (up to 1.5 mm) boundary layer, al-
though this entailed some loss of accuracy. References 7.
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USSR

UDC 532.529

KHAMIDOV, A.A.

THE PROBLEM OF THE FLOW-PAST OF A WEDGE BY A TWO-PHASE LIQUID FLOW OF
FINITE WIDTH

Tashkent NAUCHNYYE TRUDY TASHKENTSKOGO UNIVERSITETA [Scientific Works
From Tashkent University] in Russian No 476 1975 pp 111-116

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B580
(resume)]

[Text] The author discusses the symmetrical, cavitationless flow-
past of a wedge with a flare angle of $2\pi\alpha$ by a limited flow of a
ideal, incompressible, two-phase liquid (liquid+liquid). He finds
the distributions of the pressure, velocities, and the wedge's re-
sistance force. In addition, he also discusses special cases: the
flow-past of a wedge by a free jet, the flow-past of a plate by a jet
emanating from a duct, the inleakage of a free jet onto an infinite
plate, and the flow-past of a plate by a free jet of finite width.
References 5.

IL'IN, V.P., and CHALOV, A.V.

CAVITATION STRENGTH OF A LIQUID AND THE SCALE EFFECT IN THE APPEAR-
ANCE OF CAVITATION

Moscow SIMPOZIUM PO FIZIKE AKUSTICHESKO-GIDRODINAMICHESKIKH YAVLENIY, SUKHUMI, 1975 [Symposium on the Physics of Acoustic-Hydrodynamic Phenomena; Sukhumi, 1975, Collection of Works] in Russian, Izd-vo Nauka, 1975 pp 23-26

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B657 by V.I. Blyumin]

[Text] The authors mention that numerous experimental results confirm the presence of a scale effect during the onset of cavitation. As the value characterizing the scale effect of the appearance of cavitation, they propose the use of cavitation strength as determined from the expression: $z = P_d - P_m$, where P_d is the saturated vapor pressure and P_m is the minimum pressure in the flow. They show that the value of P_m , which corresponds to the moment of cavitation onset, is essentially a function of the geometric dimensions of the bodies
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USSR

IL'IN, V.P., and CHALOV, A.V., SIMPOZIUM PO FIZIKE AKUSTICHESKO-GIDRODINAMICHESKIKH YAVLENIY, SUKHUMI, 1975, Izd-vo Nauka 1975 pp 23-26

and wings, as well as the flow's parameters and the liquid's gas content. A liquid's cavitation strength is essentially a function of the concentration of nuclei and the characteristic instantaneous volume of the liquid passing through the rarefaction zone in the flow. The authors present a formula that can be used to make a quantitative estimate of the value of the scale effect of the onset of cavitation, which is caused by the difference in the concentration of nuclei and the characteristic instantaneous volumes of water on bodies of different sizes. They also show that as these values increase, the cavitation strength of water decreases.

USSR

UDC 532.5

SAYKIN, S.S.

JET FLOW-PAST OF AN OBSTACLE BY A LIMITED, UNSTEADY FLOW

Kazan' SBORNIK ASPIRANTSKIKH RABOT. KAZAN'SKIY UNIVERSITET. TOCHNYYE NAUKI. MATEMATIKA. MEKHANIKA [Collection of Graduate Students' Works From Kazan' University: Exact Sciences, Mathematics, Mechanics] in Russian 1975 pp 191-198

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B9 by P.M. Belotserkovskiy]

[Text] A plane, symmetrical jet of an ideal, weightless, incompressible liquid emanating from a duct bounded by parallel walls flows around a curvilinear obstacle by the Kirchhoff method. The flow's speed at an infinitely distant point in the duct is known and given in the form of the sum of two functions. One of them is a constant value, while the other corresponds to a complex harmonic vibration. The current's complex potential is represented in the form of two summands, one of which is independent of time. Linearized boundary conditions are used to determine the second summand.
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USSR

UDC 532.526

POLYAKOV, N.F.

INDUCTION OF HYDRODYNAMIC WAVES IN A LAMINAR BOUNDARY LAYER BY A LONGITUDINAL SONIC FIELD

Moscow SIMPOZIUM PO FIZIKE AKUSTICHESKO-GIDRODINAMICHESKIKH YAVLENIY, SUKHUMI, 1975 [Symposium on the Physics of Acoustic-Hydrodynamic Phenomena; Sukhumi, 1975, Collection of Works] in Russian, Izd-vo Nauka, 1975 pp 216-223

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B120 by A.S. Ginevskiy]

[Text] Using a low-turbulence wind tunnel, the author made an experimental investigation of the structure of the disturbances in an unstable laminar boundary layer acted upon by acoustic perturbations. He investigated various types of resonance interaction between the external acoustic field and the disturbances in the boundary layer. He presents the appropriate spectra for the velocity pulsations in the boundary layer that illustrate these resonances. The author also
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USSR

POLYAKOV, N.F., SIMPOZIUM PO FIZIKE AKUSTICHESKO-GIDRODINAMICHESKIKH YAVLENIY, SUKHUMI, 1975, Izd-vo Nauka, 1975 pp 216-223

establishes the existence of a correlation between the pressure pulsations in the external flow caused by the external acoustic field and the velocity pulsations in the boundary layer.

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USSR

UDC 533.6.011

OVSYANNIKOV, M.P.

ENGINEERING FORMULAS FOR CALCULATING VELOCITIES BEHIND A CONNECTED, AXIALLY ASYMMETRIC SHOCK WAVE

Kiev SBORNIK NAUCHNYKH TRUDOV KIEVSKOGO INSTITUTA INZHENEROV GRAZH-DANSKOY AVIATSII [Collection of Scientific Works From the Kiev Institute of Civil Aviation Engineers] in Russian No 5 1969 pp 139-141

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B169 by M.P. Mikhaylova]

[Text] The author presents a formula for computing the velocity on the surface of a conical, axially asymmetric body, around which is flowing a nonviscous, thermally nonconductive, hypersonic gas flow with a connected shock wave. He derived this formula on the basis of an approximation of the theoretical curves. The formulas for the velocity components are given as trigonometric series that contain the solutions for an axially symmetric conical flow and linearized flows.

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USSR

GRUZDEV, V. N., VINOGRADOV, YU. V. and TALANTOV, A. V.

ON THE INFLUENCE OF TURBULENCE AND RELATIONSHIP OF VELOCITIES ON THICKNESS OF A LAYER OF MIXING OF SATELLITE PLANE ISOTHERMAL JETS IN THE INITIAL SEGMENT

Kazan' TR KAZAN AVIATS IN-TA [Works of Kazan' Aviation Institute] in Russian, No 182, 1975 pp 28-33

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B982]

[Text] The authors give the results of an experimental investigation of the influence of initial intensity of turbulence on the thickness of the layer of mixing of satellite plane isothermal jets in the initial segment.

They demonstrate that with growth in initial turbulence the thickness of the layer of mixing is increased. They mention the different influence of turbilization of the middle jet and the peripheral jets. They were able to individually demonstrate the influence of the gradient of velocities and level of initial turbulence on the thickness of the layer of mixing. They give approximating formulas obtained from the results of the experiments for the

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USSR

GRUZDEV, V. N., VINOGRADOV, YU. V. and TALANTOV, A. V., TR KAZAN AVIATS IN-TA, No 182, 1975 pp 28-33 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B982]

thickness of the layer of mixing, expressed through the coefficient of the relationship of velocities and initial intensity of turbulence. References 8. Authors' abstract.

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USSR

DEYCH, M. YE., LAZAREV, L. YA., GAYDUKOV, V. I. and FADEYEV, V. A.

INVESTIGATION OF FLOWS IN INTERBLADE CHANNELS OF SUPERSONIC GRIDS

IZV AN SSSR. MEKH ZHIDKOSTI I GAZA [Bulletin of the USSR Academy of Sciences. Fluid and Gas Mechanics] in Russian, No 5, 1975 pp 145-149

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B692 by T. S. Solomakhova]

[Text] The authors give the results of an experimental investigation of a supersonic flow in interblade channels of active grids, which are distinguished by the angle of rotation of the flow in the grid, by the pitch and the width of the channels. Here with the aid of a shadow instrument they fixed the wave pattern of the flow in the channels and also measured the distribution of static pressure in the channels. They established that the character of the flow in the interblade channels depends substantially on the pitch. With a small pitch at the input to the channel a sudden jump is formed, separation of the flow begins at the input edge

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USSR

DEYCH, M. YE., LAZAREV, L. YA., GAYDUKOV, V. I. and FADEYEV, V. A., IZV AN SSSR. MEKH ZHIDKOSTI I GAZA, No 5, 1975 pp 145-149 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B692]

of the profile, which leads to a growth in pressure losses. With increase in the pitch the head jump becomes oblique and enters the channel, and the flow in it becomes supersonic everywhere and practically non-separating. With further increase in pitch, the separation flow caused by overexpansion of the current develops in the output part of the channel. The authors established the dependence of the optimal pitch of the channel, at which non-separating supersonic flow is accomplished, on the angle of rotation of the flow in the grid.

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USSR

GRUDNITSKIY, V. G. and PROKHORCHUK, YU. A.

COMPUTATION OF THE INTERACTION BETWEEN A SHOCK WAVE AND A BLUNT BODY

Novosibirsk CHISL METODY MEKH SPLOSH SREDY, T 6, No 4 [Numerical Methods of Mechanical Solid Media, Vol 6, No 4, Collection of Works] in Russian, 1975 pp 42-55

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B209 by O. K. Rozanov]

[Text] The authors examine the problem of computing the non-self-modeling interaction between a shock wave and a curvilinear surface. They used the plan suggested in the work of O. M. Belotserkovskiy, Yu. P. Golovachev, V. G. Grudnitskiy and others (Numerical Investigation of Contemporary Problems of Gas Dynamics, Moscow, Izd-vo Nauka, 1974, Referativnyy Zhurnal, Mekhanika No 4 1975 Abstract No 4B464K). Using the described algorithm they compute the development of this entire perturbed field of flow at the stage of regular two-wave reflection of the incident plane shock wave and the initial stage of the Mach reflection when the interaction between the wave and the solid surface takes place according

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USSR

GRUDNITSKIY, V. G. and PROKHORCHUK, YU. A., CHISL METODY MEKH SPLOSH SREDY, T 6, No 4, 1975 pp 42-55 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B209]

to the three-wave scheme. They propose and numerically realize a continuous transition from regular to Mach reflection with a critical angle of incidence. Here for the approximating system of difference equations they obtained a boundary problem that is closed in each time layer which permits determining the entire field of flow for the reflected shock wave and in the Mach triangle, formed by the "Mach foot", the contact fracture and the surface of the body. They give graphically presented results of the computations according to the given scheme of diffraction of plane shock waves with different Mach numbers (from 1 to 4) on a sphere and round cylinder in an ideal gas with $\gamma = 1.4$.

The obtained data are compared with the results of computations of other investigators. The discrepancy is insignificant. Thus, the value computed in the work for the pressure on the surface of a body differs no more than 2% from the value obtained by other investigators in solving the problem of diffraction of a plane shock wave on a sphere in the phase of regular reflection. They show that

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USSR

GRUDNITSKIY, V. G. and PROKHORCHUK, YU. A., CHISL METODY MEKH SPLOSH SREDY, T 6, No 4, 1975 pp 42-55 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B209]

the approach developed in this work to solving the problem may be used in computing the diffraction of a shock wave that is arbitrary in configuration and intensity on a convex curvilinear surface without breaks. References 11.

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USSR

UDC 629.78.076.7

DENISENKO, G. P.

METHOD OF DETERMINATION OF THE PARAMETERS OF MOTION OF THE CENTER OF MASS OF A FLIGHT VEHICLE USING AN ALTIMETER

TR LENINGR IN-T AVIATS PRIBOROSTR in Russian 1975, No. 95 pp 93-96

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No. 3.41.93 from the resume]

[Text] A study is made of a method of determination of the parameters of motion of the center of mass of a flight vehicle over the earth using an altimeter on the assumption of centrality of its field of gravity. With this assumption, there are no limitations on the eccentricities of the elliptical trajectories of the vehicle. It is shown that determination of the parameters of motion of the center of mass of the vehicle is reduced to the problem of estimating the parameters of the altimeter signal. In order to solve this problem it is suggested that a digital computer be used which operates by a

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USSR

DENISENKO, G. P., TR LENINGR IN-T AVIATS PRIBOROSTR 1975, No. 95
pp 93-96

recurrent procedure of estimation of the parameters by the method of least squares. The efficiency of this method is determined by means of mathematical modeling. 2 figures; 3 references.

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USSR

UDC 629.78.076.6

GRODZOVSKIY, G. L., IVANOV, YU. N., TOKAREV, V. V.

THE MECHANICS OF SPACE FLIGHT. PROBLEMS OF OPTIMIZATION

MEKHANIKA KOSMICHESKOGO POLETA PROBLEMY OPTIMIZATSII in Russian
Moscow Nauka Press 1975, 704 pp

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3 1976 Abstract No. 3.41.88K from the resume]

[Text] This book presents the mechanics of space flight. This section of mechanics involves the combined solution of problems of selection of optimal plan parameters for space flights, optimal control of motor systems and optimal flight trajectories. In comparison with the previous book by the same authors (Mekhanika kosmicheskogo poleta s maloy tyagoy [Mechanics of Space Flight with Low Thrust], Nauka Press, Moscow 1966), the present book includes new sections, dedicated to optimization of apparatus with high thrust motors and problems of the selection of parameters and control under uncertain conditions (games and statistical approaches to the problem of

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USSR

GRODZOVSKIY, G. L., IVANOV, YU. N., TOKAREV, V. V., MEKHANIKA
KOSMICHESKOGO POLETA PROBLEMY OPTIMIZATSII Moscow Nauka Press 1975,
704 pp

optimization). Furthermore, the old sections are supplemented with
new results which have appeared since the publication of the previous
book. The book is intended for engineers, scientific workers,
graduate students and students in high-level courses. 536 figures;
31 tables; 1107 references.

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USSR

UDC 629.78.076.6

NOVOSELOV, V. S.

APPLICATION OF AN AUTOMATED VERSION OF THE SMALL PARAMETER METHOD
TO THE PROBLEM OF OPTIMIZATION OF A COPLANAR IMPULSE TRANSFER

PROBL MEKH UPRAVLYAEMOGO DVIZHENIYA in Russian No. 7 Perm' 1975,
pp 99-107

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract
No. 4.41.67 from the resume]

[Text] A method is suggested for integrative construction of a
solution with an accuracy equivalent to terms of any order for the
necessary conditions of the extreme in the form of finite relation-
ships. The possibility is allowed of branching of the optimal
solution. An algorithm is constructed for numerical solution of the
problem of optimization of a coplanar two-pulse transfer between
assigned elliptical orbits with small eccentricity considering terms
of any order of magnitude. 2 references.

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USSR

UDC 629.78.017.2

MALANIN, V. V., REP'YAKH, A. V.

INFLUENCE OF SHADING OF THE SAILS AND REFLECTED FLUX ON THE ROTARY MOVEMENT OF AN APPARATUS WITH TWO SUN SAILS RELATIVE TO ITS CENTER OF MASS

PROBL MEKH UPRAVLYAYEMOGO DVIZHENIYA in Russian No. 7 Perm' 1975, pp 88-93

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.75 from the resume]

[Text] The problem is solved of studying the influence of shading of sails and reflected flux on the dynamics of the rotary planar movement of an apparatus relative to its center of mass. Differential motions are produced, results of numerical calculations are presented, and the influence of certain parameters on motion is determined. 5 figures; 2 references.

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USSR

UDC 629.78.017.2

SVYATODUKH, V. K.

CRITERIA FOR STATIC STABILITY OF SYMMETRICAL FLIGHT VEHICLES IN THREE-DIMENSIONAL MOTION

UCH ZAP TSENTR AEROGIDRODINAM IN-TA in Russian 1975, No. 5 pp 101-109

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.77 from the resume]

[Text] A general criterion is produced for static stability of symmetrically finned flight vehicles with aerodynamic interaction between the roll, course and pitch channels. The concepts of longitudinal-path static stability and the coefficient of transverse-path static stability, characterizing the static stability of the vehicle in the corresponding partial motions, are analyzed. The qualitative dependence of these coefficients on aerodynamic cross-coupling is analyzed. 3 figures; 2 references.

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USSR

UDC 629.78.017.2

IZVOL'SKIY, YE. G., KUZIN, V. P., TABACHNYY, YE. M.

SPEED-OPTIMAL CONTROL OF A QUASISTABLE OBJECT

[TR] MOSK AVIATS IN-TA in Russian 1975, No. 330 pp 15-21

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.84 by T. A. YE.]

[Text] The problem of construction of an optimal (or near-optimal) control of an object as to speed, when the parameters of the object change with a change in mode of motion, is a pressing task. Earlier, the authors studied the solution of such a problem for automatic control systems with a linear portion consisting of two integrating, and also of two integrating and one inertial elements. In this article, a solution is suggested for the problem for systems with a linear portion consisting of one integrating and one inertial, as well as two inertial and one integrating elements. 5 figures; 2 references.

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USSR

UDC 629.78.015.3:533.6.015.04

KELDYSH, V. V.

THE LIFT OF A SHORT WING WITH A BODY

UCH ZAP TSENTR AERO-GIDRODINAM IN-TA in Russian 1975, No. 5 pp 15-28

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.92 from the resume]

[Text] Thin-body theory is used to determine the lift of a short wing with a body having a cylindrical after portion, the contour of the transverse cross section of which consists of two circular arcs abutting the wing. It is shown that in the case of bodies with a pointed forward portion with certain relationships of the geometric parameters, the lift of the combination can be significantly greater than the lift of an isolated wing of the same span. 5 figures; 6 references.

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USSR

UDC 629.78.015.3:533.6.011.5

LIPATOV, I. I.

SUPERSONIC FLOW AROUND A WEDGE OF FINITE DIMENSIONS WITH STRONG INJECTION OF GAS THROUGH ITS SURFACE

UCH ZAP TSENTR AERO-GIDRODINAM IN-TA in Russian 1975, No. 5 pp 119-123

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.93 from the resume]

[Text] The study is made of the flow around a wedge of finite dimensions by a supersonic stream with strong, distributed injection of gas ($V_w = \text{const}$) through its surface. A method is developed for numerical integration of the equations describing the flow in the layer of injected gas near the surface of the wedge. As a result of numerical solution, data are produced on the distribution of pressure, the position of the contact surface and the velocity profiles in the layer of injected gas, expressed in variables of similarity. Flow modes are analyzed both with injection over the entire surface of the wedge, and with injection stopped a finite distance from the bottom section. 3 figures; 7 references.

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USSR

UDC 629.78.015.3:533.6.011.5

BASHKIN, V. A., MAYKAPAR, G. I.

EXPERIENCE IN CALCULATION OF A CONICAL SUPERSONIC FLOW BY MEANS OF INTERPOLATION

UCH ZAP TSENTR AERO-GIDRODINAM IN-TA in Russian 1975, No. 5 pp 110-114

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.94 from the resume]

[Text] Using the example of supersonic axisymmetrical conical flow, the accuracy of solution of the equations of motion of an ideal gas by approximate methods based on satisfaction of the equations of motion of the precise method at the boundaries of the area of perturbed flow (method of lines) and on the average over this area (method of integral relationships and approximation of the desired functions) is estimated. It is shown that consideration of the peculiarities of the behavior of the solution at a compression jump is achieved by introduction to the approximating expressions of a logarithmic function, which significantly increases the accuracy each of the methods.

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USSR

UDC 629.78.018.1

SYCHEV; V. V., FONAREV, A. S.

NON-INDUCTION WIND TUNNELS FOR TRANSSONIC STUDIES

UCH ZAP TSENTR AERO-GIDRODINAM IN-TA in Russian 1975, No. 5 pp 1-14

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.98 from the resume]

[Text] A theoretical investigation of transsonic flow around a profile in a tube with permeable walls is presented and the deviations introduced into the flow by the permeable wall in comparison to a flow in unlimited space are analyzed. It is noted that the effect of permeability of walls is weakened, but not completely eliminated. A method is suggested for significantly decreasing the influence of the permeability of the walls of a wind tunnel by regulation of pressure in the outer chamber surrounding the working portion; the method is based on the interrelated use of data from measurements produced in the process of the wind tunnel experiment and approximate theoretical results of flow around bodies by a transsonic unlimited strain. 7 figures; 15 references.

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USSR

UDC 629.78.018.1

VINOGRADOV, B. S., KUZ'MIN, V. A., KISLYAKOV, N. I., SHUSHIN, N. A.

EXPERIMENTAL STUDY OF THE DIFFUSOR OF A SUPERSONIC WIND TUNNEL

TR KAZAN AVIATS IN-TA in Russian 1975, No. 182 pp 23-28

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.102 from the resume]

[Text] The basic results are presented from an experimental study of the deceleration of a supersonic flow in a diffuser with full internal compression. The minimum pressure drops are determined upon startup and in the operating mode for various combinations of geometric characteristics of the diffuser. The experiments are performed on cold air with a stagnation pressure equal to atmospheric pressure with $M = 4$ and $Re = 10^5$. 4 figures; 2 references.

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USSR

UDC 629.78.023.015.4

GINZBURG, I. N., YAKOVLEV, A. A.

THE SEARCH FOR OPTIMAL PARAMETERS OF SUPPORTED SHELLS WITH TWO-PARAMETER LOADING

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL in Russian Khar'kov 1975, pp 106-107

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.148 by A. V. U.]

[Text] The following items are considered fixed: axial load, normal pressure, material of the envelope and assembly, dimensions, shape and placement of supports. Desired parameters: thickness of shell, dimensions of supports and distance between them. The goal function is the ratio of the weight of the supported envelope to the weight of a smooth cylindrical envelope. Solution is performed using a special version of the method of descent. Calculations are performed on a BESM-4M computer. The results are presented in the form of tables and graphs of the goal function as a function of the axial load for various internal pressures and relative shell lengths.

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USSR

UDC 629.78.063.001

TARKHOV, L. N., KRYUKOV, A. I.

ANALYSIS OF THE STRUCTURAL PLANS OF BALANCED COMPENSATORS FOR THE TUBING SYSTEMS OF FLIGHT VEHICLES

TR UFIM AVIATS IN-TA in Russian 1975, No. 46 pp 77-81

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 6, 1976 Abstract No. 6.41.109 from the resume]

[Text] It is noted that balanced compensators are not systematized and do not at present have any classification. This is explained not only by their relative newness, but also by the lack of published works of a summary nature, dedicated to the problems of planning of balanced compensators. This article presents a review of structural plans of balanced compensators and presents a classification. All of the variety of existing structural plans of balanced compensators is reduced to five basic systems. 5 figures; 2 references.

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USSR

UDC 519.28

POPOV, V. A., FEDOROVICH, O. YE., Khar'kov Aviation Institute

A GAMES APPROACH TO A MULTIPLE-RESPONSE EXTREME EXPERIMENT

Moscow ZAVODSKAYA LABORATORIYA in Russian No. 3, 1976 pp 323-325
manuscript received 17 Jan 74

[Abstract] An algorithm is constructed for multicriterion optimization using methods of experimental theory. In the case of two criteria, a games graphic interpretation and example are used.

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USSR

UDC 629.78.015:533.6.015.04

KAZAKOV, V. A.

DETERMINATION OF THE IMPULSE OF PRESSURE FORCES ON DELTA WINGS MOVING AT SUPERSONIC VELOCITY WHEN STRUCK BY WEAK SHOCK WAVES

UCH ZAP TSENTR AEROGIDRODINAM IN-TA in Russian 1975, No. 6 pp 22-29

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 6, 1976 Abstract No. 6.41.80 from the resume]

[Text] A theoretical study is presented of the incidence of a weak shock wave on a flat delta wing moving at supersonic speed. The cases of motion with constant values of parameters behind the leading edge of the shock wave and with linear reduction in pressure drop are studied, as well as wings with sub- and supersonic edges. The summary impulses of forces and moments over the entire time of the unstable process are determined in a linear statement. 3 figures; 5 references.

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USSR

UDC 629.78.015:533.6.015.04

KRYUKOVA, S. G., NIKOLAYEV, V. S.

EXPERIMENTAL STUDY OF OPTIMAL DELTA WINGS IN A VISCOUS HYPERSONIC STREAM
CONSIDERING BALANCING

UCH ZAP TSENTR AEROGIDRODINAM IN-TA in Russian 1975, No. 6 pp 109-113

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 6, 1976 Abstract No. 6.41.79 from the resume]

[Text] Results are presented from an experimental study of delta wings of the optimal form in a viscous hypersonic stream. The form of the surface of the wings was selected on the basis of theoretical calculations and corresponded to the maximum value of aerodynamic quality with assigned position of the center of pressure. The minimum loss of quality to balancing is experimentally established. 7 figures; 3 references.

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USSR

UDC 629.78.015:533.6

TAGIROV, R. K.

IMPROVEMENT OF THE METHOD OF CALCULATION OF TRANSSONIC FLOW AROUND
BODIES OF ROTATION

UCH ZAP TSENTR AEROGIDRODINAM IN-TA in Russian 1975, No. 6 pp 1-11

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 6, 1976 Abstract No. 6.41.78 from the resume]

[Text] An improved method is suggested for calculating transsonic flow around bodies of rotation, allowing significantly (by more than three times for a characteristic version) reduction in the digital computer calculation time while retaining accuracy. A refinement is introduced to the difference plan used in the method of establishment, allowing the order of approximation of the difference equations to be increased in the case of an uneven network in a flow field. 5 figures; 8 references.

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USSR

UDC 629.78.017.2

KHALITOV, I. KH.

ONE PROBLEM OF SYNTHESIS OF OPTIMAL CONTROL IN STOCHASTIC PROCESSES
WITH DISTRIBUTED PARAMETERS

TR KAZAN AVIATS IN-TA in Russian 1975, No. 188 pp 47-52

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 6, 1976 Abstract No. 6.41.65 from the resume]

[Text] A study is made of the problem of synthesis of the optimal control of processes described by a linear system of differential equations in partial derivatives, when random perturbations of "white noise" type are present. The optimality criterion selected is the mathematical expectation of the quadratic functional. Based on the stochastic version of the method of dynamic programming, an optimal control rule is produced. Equations are produced for evaluation of the behavior of the system on the average. An example is presented. 2 references.

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USSR

UDC 629.78.017.2

DEGTYAREV, G. L.

OPTIMAL CONTROL OF STOCHASTIC PROCESSES WITH DISTRIBUTED PARAMETERS
WITH LOCAL QUALITY CRITERION

TR KAZAN AVIATS IN-TA in Russian 1975, No. 188 pp 37-41

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 6, 1976 Abstract No. 6.41.62 by A. V. U.]

[Text] A study is made of the problem of optimal control with a local quality criterion, since the behavior of a system should be optimal in any instantaneous moment of time. Using a linear stochastic system for the state vectors, random perturbations and controls, initial and boundary conditions, as well as an equation describing the process of measurement, a criterial functional is constructed. The control function achieving its minimum is a certain operator of a measurement vector. In order to solve the problem, the stochastic maximum principal is used. The expressions for optimal control are produced. The criterion can be used for the synthesis of automatic control systems of flight vehicles, complex technological and production processes. 5 references.

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USSR

UDC 629.78.017.2

ANISOVICH, V. V.

THE STRUCTURE OF OPTIMAL CONTROL IN A NONLINEAR OPTIMIZATION PROBLEM

NELINEYN MEZHANIKA No. 1 in Russian Dnepropetrovsk 1975, pp 126-128

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 6, 1976 Abstract No. 6.41.61 from the resume]

[Text] A study is made of the problem of optimal control for equations with right portions homogeneous as to coordinate and control. The problem of optimal speed and the problem of minimization of a sign-defined integral functional are analyzed. Conditions are formulated for these problems which, when fulfilled, place the optimal control at the boundary of the control area. 5 references.

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USSR

UDC 629.78.017.2

TETERIN, A. D.

CALCULATION OF FORCES AND MOMENTS OF FORCES OF VISCOUS FRICTION ACTING ON THE FLOATS OF A MAGNETIC DAMPER

TR XX NAUCH KONF MOSK FIZ-TEKHN IN-TA 1974 SER "AEROFIZ I PRIKL MAT" CH 2 in Russian Dolgoprudnyy 1975, pp 140-153

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 6, 1976 Abstract No. 6.41.60K by T. A. YE.]

[Text] A study is made of the dynamics of motion of a gravitationally stabilized satellite with a magnetic damper. The damper consists of a permanent magnet (damper float) and a spherical shell. The float is placed within the spherical cavity in the body of the damper. The gap between the float and the body is filled with a viscous fluid, in which energy is dissipated during relative motion of these bodies. A study is made of the motion of the viscous incompressible fluid filling the gap between the two spheres. The forces and moments acting on the float are calculated. The results are compared with the results produced by other authors. 2 figures; 3 references.

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USSR

UDC 539.3

KALUZHSKIY, I. I. and ARYSHENSKIY, YU. M.

ON THE STRUCTURE OF THE MATERIAL TENSOR OF AN ORTHOTROPIC MEDIUM

[TRUDY]. KUYBYSHEVSKIY AVIATIONNIY INSTITUT [(Works). Kuybyshev Aviation Institute] in Russian No 1, 1975 pp 34-40

[From REFERATIVNIY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V25 by the authors]

[Text] The paper gives the results of a theoretical analysis of the material tensor of an orthotropic medium. The resultant supplementary relations between components of the material tensor enable determination of the index of anisotropy of sheets in special cases from the tensile tests of specimens cut in two directions.

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USSR

UDC 533.6.011.72

KLIMISHIN, I. A. and NOVAK, A. F.

CONCERNING THE MOTION OF RELATIVISTIC SHOCK WAVES IN STELLAR ATMOSPHERES

TSIRKULYAR. ASTRONOMICHESKAYA OBSERVATORIYA L'VOVSKOGO UNIVERSITETA [Circular. Astronomical Observatory, L'viv University] in Russian, No 50, 1975 pp 3-5

[From REFERATIVNIY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B193 by I. V. Ioffe]

[Text] The paper gives the results of a numerical calculation of the velocity of a relativistic shock wave in an ideal gas with classical ratio of heat capacities. The velocity is calculated as a function of the distance covered by the wave from the center of a star. It is found that an initial rapid speed increase is replaced by a slow rise. The calculation was done by a formula proposed by the authors in previous research. The distance traversed by the shock wave is calculated in the conclusion.

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USSR

UDC 532.526

KUZ'MINSKIY, V. A.

ON TOTAL STABILIZATION OF THE FLOW IN A BOUNDARY LAYER AT SUPERSONIC SPEEDS

UCHENYYE ZAPISKI TSENTRAL'NOGO AERO-GIDRODINAMICHESKOGO INSTITUTA [Scientific Annals of the Central Aerohydrodynamics Institute] in Russian Vol 6, No 5, 1975 pp 45-54

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B117 (résumé)]

[Text] An examination is made of the problem of hydrodynamic stability of laminar flow in a boundary layer relative to small perturbations at supersonic velocities of the oncoming flow. The temperature of the cooled surface is found as well as the parameter that determines suction intensity for values that stabilize flow up to arbitrarily high Reynolds numbers. References 6.

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USSR

UDC 531.36;531.31;531.391.5

SOKOLOV, N. I., MAKOVLEV, V. I. and NOVIKOV, A. N.

SOME SUFFICIENT CONDITIONS OF STABILITY OF LINEAR QUASISTATIONARY SYSTEMS

[TRUDY] MOSKOVSKOGO AVIATIONNOGO INSTITUTA [(Works) of the Moscow Aviation Institute] in Russian No 330, 1975 pp 51-56

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4A94 by V. A. Gorinshteyn]

[Text] An investigation is made of the properties of a characteristic polynomial with variable coefficients that are linear functions of a characteristic variable parameter. The need for such a study frequently arises in the design of automatic control systems.

Analytical sufficient conditions are derived in the paper for the stability of systems with a characteristic polynomial of the given kind for any value of the variable parameter within a finite range.

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USSR

FENDRIKOV, I. A., FRIDLAND, V. YA. and SHMAKOV, I. P.

INVESTIGATION OF TURBULENCE OF A STREAM IN THE VICINITY OF AN
EDDY FORMER

Kiev SB NAUCH TR KIEV IN-T INZH GRAZHD AVIATSII [Collection of
Scientific Works of Kiev Institute of Civil Aviation Engineers]
in Russian, No 5, 1969 pp 98-100

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B
1322 by B. I. Bakum]

[Text] The authors investigated the influence of a single transversely arranged slot on the microstructure of a plane gradient-free stream. The investigations were conducted in a plane wind tunnel of closed type. As the model they used a plate with a single slot with a cross section of (5-20) X (5-20) mm, placed at a distance of 500 mm from the nose. The speed of the advancing stream was 30 m/s, the initial turbulence was equal to 1.1%. The measurements were made with a thermoanemometer over the entire thickness of the boundary layer in a range from 0.1 to 15 mm. They demonstrated that the large slots increase turbulence of the stream and that their influence is extended far below the stream.

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USSR

ILIZAROVA, L. I.

EXPERIMENTAL INVESTIGATIONS OF THE PULASTIONS IN PRESSURE IN A
CURRENT AND ON THE WALL OF THE WORKING PART OF TWO WIND TUNNELS
IN THE RANGE OF NUMBERS $0 < M \leq 4.0$

Moscow SIMPOZ PO FIZ AKUST-GIDRODINAM YAVLENIY, SUKHUMI, 1975
[Symposium on the Physics of Acoustical-Hydrodynamic Phenomena,
Sukhumi, 1975, Collection of Works] in Russian, Izd-vo Nauka, 1975
pp 285-288

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B
1319 by B. I. Bakum]

[Text] The author gives the results of measurements of pulsations in pressure in the working parts of a supersonic wind tunnel for $M = 2, 3$ and 4 and a low-turbulent wind tunnel in the velocity range of $U = 40-110$ m/s. The author shows that when $M = 2$ the amplitude of the pulsations on the wall is significantly higher than on the model of a wedge installed on the axis of the tunnel (the wedge was equipped with a piezoceramic sensor mounted flush with its surface); when $M = 4$ the levels of the pulsations were compared. References 6.

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USSR

KUROCHKINA, N. YA. and TAGIROV, R. K.

TRANSSONIC FLOW AROUND BODIES OF ROTATION WITH A CHANNEL IN THE PRESENCE OF COAXIAL JETS FLOWING FROM THE INTAKE PART

Tomsk MATERIALY 5-Y NAUCH KONF PO MAT I MEKH. TOMSK UN-T. T 2 [Materials from the Fifth Scientific Conference on Mathematics and Mechanics. Tomsk University. Vol 2, Collection of Works] in Russian, Izd-vo Tomsk University, 1975 pp 12-13

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1275]

[Text] The authors numerically solve the problem of flow around bodies of rotation, type of motor nacelles of two-circuit jet engines, subsonic, transsonic and supersonic current in the presence of one or two coaxial jets flowing from the intake part of the body. Solution is achieved in the process of establishment in time, the difference scheme of S. K. Godunov being used for integration of the complete system of nonstationary equations of an ideal gas. The boundaries of the jet, being contact discontinuities, are separated, and for solution the authors use the difference network that is mobile in the direction of the ordinate axis. Authors' abstract.

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USSR

KHIMICH, V. L. and POZOLOTIN, A. K.

INVESTIGATION OF THE ROTOR SEPARATOR OF MOISTURE FOR A HYDROTHERMODYNAMIC AIR INTAKE

Ufa TR UFIM AVIATS IN-TA [Works of Ufa Aviation Institute] in Russian, No 46, 1975 pp 48-52

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1238]

[Text] The authors cite experimental data on the effectiveness of operation of a rotor self-rotating separator of moisture designed for installation in hydrothermodynamic air intakes. They demonstrate the influence on effectiveness of moisture removal of the operational and structural factors, and also the influence of the separator on the amount of hydraulic losses and uniformity of the current of air at the input to the engine. They give a comparative evaluation of the rotor and static separators. Authors' abstract.

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USSR

VOROTYNTSEV, M. A. and SAZONOVA, N. I.

ON A DETERMINATION OF THE MOMENTS OF AERODYNAMIC FORCES ACTING ON THREE-DIMENSIONAL BODIES FLOWED AROUND UNDER CONDITIONS OF THE "LAW OF LOCALITY"

Moscow VESTN MOSK UN-TA. MAT, MEKH [Bulletin of Moscow University. Mathematics and Mechanics] in Russian, No 1, 1976 pp 104-109

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1221 by G. I. Maykapar]

[Text] The authors demonstrate that in the case of representing the coefficient of pressure and resistance of friction by a power series normal to the surface of the body of the component the velocities of the advancing current for computing the moment acting on the body may be used by expansion into a series of spherical functions. The computations are reduced to a comparatively small number of integrals. References 5.

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USSR

SUKHARIKOV, YU. V.

HEURISTIC MODEL OF JET CONTROL OF FLOW AROUND A WING

Kiev SB NAUCH TR KIEV IN-T INZH GRAZHD AVIATSII [Collection of Scientific Works of Kiev Institute of Civil Aviation Engineers] in Russian, No 5, 1969 pp 73-78

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1194 by B. I. Bakum]

[Text] The author gives a qualitative description of the character of flow around a profile with a jet flap. He explains the reasons for combining the separated stream during the jet blasting in the zone of separation and the difference in the character of flow around with different ratios of velocities of the basic stream and the jet. He cites characteristic experimental data. References 7.

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USSR

YEVDUCHENKO, YU. S.

ON AN ANALYSIS OF THE INFLUENCE OF THE STRUCTURAL BACKWASH PARAMETER ON THE EFFECT OF A TWO-COMPONENT FLAP

Kazan' TR KAZAN AVIATS IN-TA [Works of Kazan' Aviation Institute] in Russian, No 190, 1975 pp 22-26

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1192]

[Text] The author discusses materials from experimental investigations on the influence of shift in the backwash along the chord of the profile of the wing of a two-component flap. He cites data on comparing the aerodynamic characteristics of a one-slot and two-component flaps for the same values of backwash.

He establishes that the effectiveness of the two-component flap may be increased by shifting it along the chord of the profile of the wing. Author's abstract.

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USSR

NAZAROV, N. T.

INVESTIGATION OF A BLUNTED JET FLOW MOVING AT AN ANGLE TO ITS OWN AXIS

GIDRAVLIKA I GIDROTEKHN. RESP MEZHVED NAUCH-TEKHN SB [Hydraulics and Hydrotechnology. Republic Interdepartmental Scientific and Technical Collection] in Russian, No 22, 1976 pp 53-57

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1024]

[Text] The author gives the results of laboratory investigations of a blunted jet flow from a rotating flute. He gives formulas for determining the flow rate and maximal velocity in the cross section of the moving jet flow, and also the differential equation of its bent dynamic axis. References 5.

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USSR

RUBEZHANSKIY, V. I. and GRANOVSKAYA, R. G.

LAMINAR FREE CONVECTION OF A MICROSTRUCTURAL FLUID NEAR A VERTICAL SURFACE

Voronezh TR NII MAT. VORONEZH UN-TA [Works of the Scientific Research Institute of Mathematics. Voronezh University] in Russian, No 18, 1975 pp 12-16

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B439]

[Text] A self modeling solution is obtained for the free convection of a micropolar fluid near a vertical plate. The antisymmetrical part of the stress tensor is not taken into account in the equation for the speed of microrotation. The authors found that for $Pr = 0.72$ the increase in coefficient of rotational viscosity, and also the parameter which characterizes the moment viscosity, leads to a decrease in the maximal longitudinal speed at the boundary layer. Data are cited relative to the speed for the number $Pr = 7$. Authors' abstract.

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USSR

BAGAYEV, G. I., LEBIGA, V. A. and KHARITONOV, A. M.

RADIATION OF SOUND BY A SUPERSONIC TURBULENT BOUNDARY LAYER

Moscow SIMPOZ PO FIZ AKUST-GIDRODINAM YAVLENIY, SUKHUMI, 1975 [Symposium on the Physics of Acoustical-Hydrodynamic Phenomena, Sukhumi, 1975, Collection of Works] in Russian, Izd-vo Nauka, 1975 pp 276-281

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B235 by M. G. Lebedev]

[Text] The authors investigate the influence of perturbations of an advancing flow on the transition of a laminar boundary layer to a turbulent one on a model of a flat plate at supersonic velocities. The experiments were conducted in a wind tunnel with a size of the working part of 0.2×0.2 m with Mach numbers $M = 2, 3, 4$ in a range of individual Reynolds numbers $Re_M = (5.0-70) \cdot 10^6 \text{ m}^{-1}$. They investigated the dependences of intensity, propagation velocity and directionality of the perturbations generated by the turbulent boundary layer on the M and Re_M numbers. They made a frequency analysis of the intensity and directionality of the radiation. The obtained results show that along with the Mach number and the stress on the wall, an important factor which influences the intensity of radiation is the thickness of the boundary layer.

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USSR

KOCHERYZHENKOV, G. V. and MATVEYEV, S. K.

MODIFIED LAW OF A WALL AND ITS APPLICATION TO COMPUTING THE TURBULENT BOUNDARY LAYER WITH BLASTING (SUCTION)

Leningrad UCH ZAP LGU [Academic Notes of Leningrad State University] in Russian, No 384, 1975 pp 91-105

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B158]

[Text] The authors suggest a refined modification of the law of the wall for the case of a permeable surface on the basis of analyzing numerical solutions to differential equations of a turbulent boundary layer. The obtained modification is used in constructing an approximate method of computing the turbulent boundary layer. Comparison with numerical solutions indicates a high effectiveness of the examined approximate method in a rather wide range of variation in blasting intensity. References 25. Authors' abstract.

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USSR

BEREZIN, YU.A. and DMITRIYEVA, O. YE.

NUMERICAL STUDY OF A TURBULENT BURGERS MODEL

Novosibirsk TR V VSES SEMINARA PO CHISL METODAM MEKH VYAZKOY ZHIDKOSTI. CH 2 [Works of the Fifth All-Union Seminar on Numerical Methods of the Mechanics of a Viscous Fluid. Part 2] in Russian, 1975 pp 133-150

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B112 by V. R. Kuznetsov]

[Text] The authors give the results of a numerical solution to the Burgers equation. The computations were made with Reynolds numbers $(0.5-1.6)Re_*$ (Re_* is the critical Reynolds number). The pulsation velocity component is presented in the form of a Fourier series. They numerically solved the equations for the amplitudes of the individual harmonics. With the given Reynolds numbers a good accuracy is obtained for the computations by using 20 and higher harmonics. The authors established that the amplitude of the harmonics with sufficiently large wave numbers varies exponentially with variation of the wave number. The exponent is decreased with increase in the wave number. The amplitude of the harmonics is sharply increased with increase in the Reynolds number. References 7.

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USSR

MKHITARYAN, A. M., FRIDLAND, V. YA. and BATAL'YANETS, V. A.

ANALYSIS OF THE STABILITY OF TWO-DIMENSIONAL EFFLUENCE TYPE FLOW

Kiev SB NAUCH TR KIEV IN-T INZH GRAZHD AVIATSII [Collection of Scientific Works of Kiev Institute of Civil Aviation Engineers] in Russian, No 5, 1969, pp 101-105

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B83 by V. N. Shtern]

[Text] The authors study the flow of a viscous fluid of eddy effluence type when the radial velocity $u = -Q/(2\pi r)$ is determined by the assigned flow rate Q , and the tangential velocity $v = C_1 r^{1-a} + C_2 r$, where $a = Q/(2\pi \nu)$ is the analog of the Reynolds number. With flow between cylinders the constants C_1 and C_2 are determined from the assigned values of v on the walls. In the case of boundaryless region only the condition of rest at infinity is formulated. Then when $a \leq 1$ there follows that $C_1 = 0$. The constant C_2 remains arbitrary. Hence the authors conclude that an effluence type flow ($C_2 = 0$) is unstable.

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USSR

UDC 532.57+532.137+536.51+532.14.08+531.787

DANELIYA, N.F., and NAMGALADZE, D.P.

A TECHNIQUE FOR THE EXPERIMENTAL DETERMINATION OF THE VORTEX COLLAPSE FREQUENCY DURING THE FLOW-PAST OF A THIN FLAT BY A PLANE FLOW

TRUDY GRUZINSKOGO POLITEKHNICHESKOGO INSTITUTA [Works of the Georgian Polytechnic Institute] in Russian No 2(175) 1975 pp 21-22

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B1195 (resume)]

[Text] The use of existing methods for the experimental measurement of the vortex collapse frequency during the flow-past of a thin plate entails great difficulties. In connection with this, the authors propose a new technique for the experimental measurement of this value that is based on the fact of a pressure fluctuation in the wake behind the obstacle and is implemented with the help of resistance sensors and a simple electrical circuit. They describe the recording device and the method use to process the obtained oscillograms.

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USSR

SALAMASHKIN, V. A.

ON SEVERAL FEATURES OF THE FLOW IN A CHANNEL OF COMPLEX SHAPE

Kazan' TR KAZAN AVIATS IN-TA [Works of Kazan' Aviation Institute]
in Russian, No 184, 1975 pp 36-40

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B970]

[Text] The author examines the features of flow in a channel of a choking device with a dosing element of rotational type. Visual observation of the flow in the given range of angles of rotation of the choking baffle reveals an impulse regime of flow. During drainage tests hysteresis phenomena appear in the form of a non-coincidence of values of static pressure in the coincident points of the channel of the choking device for the device of the dosing element as a function of its original position. Author's abstract.

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USSR

MUKHACHEV, G. A., KHABIBULLIN, F. G. and ARSLANOVA, S. N.

ON THE COMPUTATION OF UNBALANCED CONDENSING SUPERSONIC FLOWS

Kazan' TR KAZAN AVIATS IN-TA [Works of Kazan' Aviation Institute]
in Russian, No 184, 1975 pp 40-46

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B563]

[Text] On the basis of comparative computations for the system of equations which describe the adiabatic unifrom flow of a spontaneously condensing vapor, the authors make a conclusion as to the identity of the most employed expressions both for the rate of growth of the drop and for the rate of nucleus formation appearing in the equation for the accumulation of the condensate.

They examine two basic approaches to determining the form of the correction. They mention that these corrections which describe one and the same phenomenon differ by the sign of the effect. They demonstrate the necessity of future investigations for the ultimate purpose of determining reliable values of the correction coefficients. References 10. Authors' abstract.

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USSR

KATAYEV, S. P.

ON THE QUESTION OF STABILIZING A SATELLITE WITH A FLYWHEEL

Leningrad PRIKL MEKHANIKA. VYP 2 [Applied Mechanics, No 2, Collection of Works] in Russian, Izd-vo Leningrad University, 1975 pp 43-47

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3A98]

[Text] The author examines the problem of stabilizing a satellite with a flywheel in the direction lying in the orbital plane according to which the center of mass of the satellite moves. Taking into account the process in the electrical circuit of the flywheel armature, the author found the law of control of voltage supplied to the clamps of the flywheel motor. By direct integration of the equations of motion in the found control he demonstrates the asymptotic stability of the stabilized state of the satellite. Author's abstract.

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USSR

UDC 629.78:621.396.67

KALYUZHNYI, V. P.

THE PROBLEM OF ALGORITHMIZATION OF THE PROCESS OF STABILIZATION OF THE BEAM OF A PHASED ANTENNA ARRAY ON A MOVING PLATFORM

TR LENINGR IN-T AVIATS PRIBOROSTR in Russian 1975, No. 95 pp 31-33

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No. 3.41.272 from the resume]

[Text] A study is made of the method of production of an algorithm realizing stabilization of the angular position of the beam of a phased antenna array located on a moving base. An algorithm is presented for the operation of the computer and the volume of computation is estimated. 2 references.

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USSR

UDC 629.78:533.1

KRISHTAL', V. I.

ANALYSIS OF THE TWO-DIMENSIONAL INTERACTION OF A TRANSVERSE SONIC
JET WITH A SUPERSONIC FLOW

TR KAZAN AVIATS IN-TA in Russian 1975, No. 182 pp 16-23

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No.
3.41.107 from the resume]

[Text] Certain parameters of the separation of a two-dimensional
turbulent layer before a jet obstacle are summarized. A theorem on
momentum is used to produce relationships for approximate estimation
of the dimensions of the separated zone. 5 figures; 1 table; 15
references.

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USSR

ILYUNIN, V.G., KUZ'MIN, A.M., MUROGOV, V.M., ORLOV, V.V., SILAYEV, Yu.V.,
TROYANOV, M.F., SHMELEV, A.N., YUROVA, L.N.

HIGH POWER FAST REACTORS WITH COMBINED USE OF URANIUM-235 AND PLUTONIUM

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA
BYSTRYKH NEYTRONAKH [State and Perspectives of Work on Designing AES With
Reactors Using Fast Neutrons, Collection of Works] in Russian Vol 3, 1975
pp 20-36

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 2 1976 Abstract No 2U77 by
Ye. A. Kremenevskaya]

[Text] The efficiency of combined use in a BR [fast reactor] of U²³⁵ and Pu²³⁹
was studied. The efficiency of this YaT [nuclear heat] is defined as the in-
crease in unit capacities of the BR up to 1000-2000 Mw, which in turn, is ex-
pedient from the standpoint of reducing the specific capital investments and
from the standpoint of the economics of the fuel-supply cycle. Combined use of
U and Pu in the active zone of the BR is one of the possible ways of ensuring

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USSR

ILYUNIN, V.G., KUZ'MIN, A.M., MUROGOV, V.M., ORLOV, V.V., SILAYEV, Yu.V.,
TROYANOV, M.F., SHMELEV, A.N., YUROVA, L.N., SOSTOYANIYE I PERSPEKTIVY RABOT PO
SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH Vol 3, 1975 pp 20-36

stability and efficiency in flattening the profile of the heat release field;
the value of the internal coefficient of reproduction of reactivity in this case
is close to unity, since in the internal subzone a fuel (plutonium) is produced
which is more efficient (~30 percent) than the depleting U²³⁵; a more negative
value of the sodium coefficient of reactivity is ensured. This permits an in-
crease in the length of operating the BR without reloading and considerable rise
in the power voltage and rates of reproduction of the YaT. Illustrations 5,
tables 8, references 8.

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USSR

UDC 621.311.25:621.039.526

RINEYSKIY, A.A., ORLOV, V.V., SUBBOTIN, S.A., YAROVITSIN, V.V., NOVOZHILOV, A.I.

PARAMETER OPTIMIZATION OF AES WITH A LARGE FAST REACTOR

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH [State and Perspectives of Work on Designing AES With Reactors Using Fast Neutrons, Collection of Works] in Russian Vol 1, 1975 pp 152-159

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 2 1976 Abstract No 2U57 by G.I. Korotkina]

[Text] The temperature and pressure of the AES steam power cycle have a substantial influence on the physical characteristics of the BR [fast reactor] and on the economic indicators of AES as a whole. By means of the optimization program ROKBAR, a study was made of the influence of the temperature of the heat-transfer agent at the output from the BR on the doubling time (T_2) and reproduction coefficient (KV). A study was made of the range of preheatings of the heat-transfer agent (sodium) in YaR [nuclear reactor] 150-240°C, which

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USSR

RINEYSKIY, A.A., ORLOV, V.V., SUBBOTIN, S.A., YAROVITSIN, V.V., NOVOZHILOV, A.I. SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH Vol 1, 1975 pp 152-159

corresponds to the output temperatures of 500-530°C. The thermal power for all variants was assumed as 4300 Mw. Plutonium from the thermal YaR was used as fuel, with the initial isotope composition: $Pu^{239}/Pu^{240}/Pu^{241}=0.64/0.25/0.11$. The time of the external fuel-supply cycle was assumed as 0.5 years. Results are given of estimates of the effect of warming up the heat-transfer agent on the characteristics of a high-power YaR, particularly on the economic characteristics of YaR depending on the efficiency and preheating. Tables 2.

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YEVETSKIY, YU. L., MITIN, R. V. and PETRENKO, V. I.

CONCERNING INITIATION OF HIGH-CURRENT DISCHARGES IN DENSE GASES

Khar'kov VOPROSY ATOMNOY NAUKI I TEKHNIKI. SERIYA FIZIKI PLAZMY I PROBLEM UPRAVLYAYEMYKH TERMOYADERNYKH REAKTSIY [Problems of Nuclear Science and Technology. Series on Plasma Physics and Problems of Controlled Thermonuclear Reactions, Collection of Works] in Russian No 1(3), 1975 pp 60-63

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1975 Abstract No 4B301 (résumé)]

[Text] The paper discusses possible methods of initiating high-pressure gas discharges (of the order of 100 atmospheres or higher). The results of experiments on laser initiation of such discharges are presented. Consideration is given to the feasibility of discharge initiation at pressures of 100-1000 atmospheres by an x-ray beam. References 10.

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USSR

NESENEKO, G. A. and PITOVVRANOV, S. YE.

ALLOWING FOR THE INFLUENCE OF MOVABLE BOUNDARIES IN A BOUNDARY PROBLEM FOR THE BURGERS EQUATION AT SMALL VISCOSITY

Tomsk MATERIALY 5-Y NAUCH KONF PO MAT I MEKH. TOMSK UN-T, T 2 [Materials from the Fifth Scientific Conference on Mathematics and Mechanics, Tomsk University, Vol 2, Collection of Works] in Russian, Izd-vo Tomsk University, 1975 pp 95-96

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B47]

[Text] The authors investigate frequently encountered (in practical problems) cases of the boundary problem for the Burgers equation in the region whose boundaries vary in time

$$\begin{aligned} u_t + uu_x &= \nu u_{xx} \\ u(t, x) \Big|_{t=0} &= f(x), \quad u(t, x) \Big|_{x=\varphi_1(t)} = \psi(t), \\ u(t, x) &\rightarrow 0 \quad x \rightarrow -\infty \end{aligned} \tag{1}$$

By familiar substitution this problem may be reduced to an investigation of the boundary problem for the equation of thermal conductivity. The appendices have an interesting case when the viscosity of the medium ν is small. They find the asymptotic solution

USSR

NESENEKO, G. A. and PITOVVRANOV, S. YE., MATERIALY 5-Y NAUCH KONF PO MAT I MEKH. TOMSK UN-T, T 2, 1975 pp 95-96 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B47]

for small values of ν . This solution is the sum of two asymptotic expansions. The first of these is associated with allowing for the initial conditions and the second with allowance for the boundary conditions. The first terms of the expansion are found in explicit form, for the following terms of expansion they found simple recurrent relationships. The obtained results agree well with the general principle of boundary layer corrections and give an effective algorithm for solving the original problem. Authors' abstract.

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USSR

UDC 532.72;669.015.23

SUBBOTIN, V.I., and USHAKOV, P.A.

HYDRODYNAMICS IN REACTOR CORES

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONOV [Current State and Prospects of Projects for Developing AES's With Fast Neutron Reactors, Collection of Works] in Russian Vol 2, 1975 pp 203-222

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B500 by A.V. Ivanov]

[Text] The authors examine different methods of calculating the hydrodynamic characteristics of a series of nuclear reactor ducts. For the case of regular fuel element lattices they obtain an approximate solution of problems involving laminar and turbulent currents. Here they reduce the problem of a laminar heat carrier current to finding the coefficients of the Fourier series describing the distribution of the tangential stresses along the fuel element's perimeter. In their discussion of the turbulent current mode, they use the universality of the velocity profiles in the ducts. They also give empirical

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USSR

SUBBOTIN, V.I., and USHAKOV, P.A., SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONOV Vol 2, 1975 pp 203-222

relationships that allow for the effect of ribbing and estimates of the resistance coefficients for the current mode that is transitional from laminar to turbulent. For a current in circular ducts, the authors present approximate expressions for determining the radius of the maximum velocity line, the velocity profiles, hydraulic losses, and the effect of eccentricity. For the cases mentioned above, they give generalizing formulas for friction coefficient calculations over a wide range of parameter changes. On the basis of filtration theory they discuss approximate solutions of the problems for large fuel element assemblies. They also analyze questions of the hydrodynamics in ducts with an arbitrary cross-section. References 50.

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USSR

UDC 532.72;669.015.23

VOLCHKOV, L.G., IL'INOV, YU.P., KOZLOV, F.A., and NALIMOV, YU.P.

MASS EXCHANGE OF IMPURITIES IN A SODIUM FLOW

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONOV [Current Stat and Prospects of Projects for Developing AES's With Fast Neutron Reactors, Collection of Works] in Russian Vol 2, 1975 pp 203-222

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B457 by A.V. Ivanov]

[Text] The authors present materials from their experimental investigation of the distribution of the mass of impurities (sodium oxide) over the surfaces of a flow-type cold trap during the purification of sodium used as a heat carrier. They show the design of the stand on which they observed the precipitation of the sodium oxide from the flow during counterflow mixed convection as a function of the oxygen concentration and the thermal flow's distribution over the height of the experimental setup. During the experiments they used chromel-alumel thermocouples to measure the heat carrier's temperature and magnetic flowmeters to measure the flow rate. In addition, they

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USSR

VOLCHKOV, L.G., IL'INOV, YU.P., et al., SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONOV, Vol 2, 1975 pp 203-222

determined the sodium oxide distribution over the height of the section by periodic radioscopy of the experimental section with γ -rays. From the results of the experiments the authors derived the values of the mass-exchange coefficients. They point out their complicated dependence on the hydrodynamic, temperature, and initial concentration conditions.

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USSR

UDC 536.24:532.54

SUBBOTIN, V.I., USHAKOV, P.A., ZHUKOV, A.V., MATYUKHIN, N.M., YUR'YEV, YU.S., and KUDRYAVTSEVA, L.K.

HEAT EXCHANGE IN THE CORES AND SCREENS OF FAST REACTORS

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONOV [Current State and Prospects of Projects for Developing AES's With Fast Neutron Reactors, Collection of Works] in Russian Vol 2, 1975 pp 5-47

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B394 by L.N. Neymotin]

[Text] The authors present the theoretical and experimental results of their investigation of heat exchange in the magazines of the fuel elements of fast reactors with a sodium heat carrier. For elements located in the central part of the magazines, they suggest a generalized interpolation relationship in the form

$$Nu = Nu_{lam} + f(\varepsilon, x) Re^{\phi(x)},$$

where $1 \leq x \leq 2$ = relative spacing in a bundle of fuel elements; $\varepsilon = \lambda_w / \lambda_f \geq 0.01$; $Re < 4,000$. They also present expressions for the

USSR

SUBBOTIN, V.I., USHAKOV, P.A., et al., SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONOV Vol 2, 1975 pp 5-47

nonuniformity of the temperature along the perimeter of the central and peripheral fuel elements. The authors analyze the effect on the magazines' heat exchange and temperature fields of displacers and ribbing of the fuel elements, free convection, nonuniformity of the heat carrier's flow rate in the central and peripheral cells, different heat generation rates in different fuel elements, interchannel mixing of the heat carrier, and so on. References 21.

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3

USSR

UDC 539.431.004

POROKHOV, V. S., Scientific Research Institute for Motor Vehicle Instruments

A METHOD OF TESTING THE CONTACT FATIGUE STRENGTH OF MATERIALS TO BE USED IN MOTOR VEHICLE TRANSMISSIONS

Moscow AVTOMOBIL'NAYA PROMYSHLENNOST' in Russian No. 5, May 76
pp 37-38

[Abstract] It is determined that the contact fatigue strength of a material is a function of many factors. Specifications are given for specimens to be used to standardize the method of testing of materials for contact fatigue strength. The specimens recommended for determination of contact fatigue strength and the recommended conditions of testing can be used to develop a standard method for testing of materials.

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USSR

UDC 629.113.037

ANDRONOV, M. A., MEZHEVICH, F. YE., CHUZHUSTOV, YU. C., NAUMOV, I. V., Central Scientific Research Institute for Motor Vehicles and Engines

CALCULATION AND EXPERIMENTAL STUDY OF CERTAIN ERGONOMETRIC QUALITIES OF THE DRIVER'S POSITION IN A VEHICLE

Moscow AVTOMOBIL'NAYA PROMYSHLENNOST' in Russian No. 5, May 76
pp 24-26

[Abstract] Evaluation of the ergonomic qualities of the driver's position in a vehicle is currently conducted largely using subjective data from visual observation of the driver's position. Methods of investigation are required which allow mathematical formalization, based on objective criteria and unified methods of consideration of the anthropometric characteristics of drivers. This article studies the development of methods of consideration of the anthropometric characteristics of drivers in studies of the ergonomic qualities of driver's positions, based on the use of the coordinates of the control point of the driver's seat R, defined using a three dimensional articulated dummy.

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USSR

UDC 629.113.073

KADOLKO, L. I., ZHUKOV, A. V., ABRAMOVICH, K. B., SMEYAN, A. I.,
SHISHLO, V. P., PETROVICH, A. I., Minsk Motor Vehicle Plant

THE INFLUENCE OF ROAD SURFACE QUALITY AND THE PARAMETERS OF A
SEMITRAILER RIG ON ITS STABILITY AGAINST SIDE SLIPPING

Moscow AVTOMOBIL'NAYA PROMYSHLENNOST' in Russian No. 5, May 76
pp 17-18

[Abstract] The stability of a semitrailer rig against side slipping is determined by the adhesion of the suspension system with the road in the lateral direction. When one of the axles of the rig loses adhesion with the road, if side forces are present, elements of the rig will shift laterally. This article presents a study of the stable motion of a semitrailer rig over a curve of constant radius, ignoring lateral elasticity of the tires. Criteria are suggested for estimating the stability of the rig, a calculation plan and results of calculation are given for two types of roads with various speeds and radii of circular trajectories using three structural parameters and the rigidity of the suspension systems of the tractor and semitrailer.

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USSR

UDC 629.113.004.056.13

KUZNETSOV, YE. S., GILELES, L. KH., INTYAKOV, N. G., GAL'BURT, A. YE.,
ZLATKEVICH, YE. A., LAVRINOVICH, YE. A.

STUDY OF RELIABILITY AND PREVENTIVE MAINTENANCE MODES OF HIGH CAPACITY
TRUCKS

Moscow AVTOMOBIL'NAYA PROMYSHLENNOST' in Russian No. 2, Feb 76
pp 17-19

[Abstract] The studies are intended to solve two main problems. One, to determine the least reliable units, sections and parts of the trucks, to develop and implement recommendations for improvement of their design and manufacturing quality; two, to improve the maintenance of the vehicles in order to maintain high reliability over long operating periods. Based on the results of the work, in 1975 the Ministry of Motor Transport of the RSFSR has approved norms for the maintenance and repair of the MAZ-500 and 500A trucks. The maintenance cycle of the 500A is increased from 2200 to 2500 km, the standardized labor consumption of maintenance is reduced from 6.5 to 6 manhours per 1000 km.

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USSR

UDC 629.113.004.67

IVASHCHENKO, N. I., TRIKOZYUK, V. A., TESYAZH, A. A., Kiev Institute
for Motor Vehicles and Roads

DETERMINATION OF THE REQUIREMENTS FOR SPARE PARTS DUE TO SUDDEN FAILURES
OF PARTS

Moscow AVTOMOBIL' NAYA PROMYSHLENNOST' in Russian No. 1, Jan 76
pp 11-13

[Abstract] Formulas are presented for determination of the numbers of spare parts which should be maintained in reserve stock to cover sudden failures of parts in use. The application of the method suggested is illustrated by an example of calculation of the number of spare Diesel engine fuel injector nozzles which should be maintained depending on the number of vehicles in use and mean mileage.

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Construction

USSR

VORONIN, I. A.

EXPERIMENTAL INVESTIGATIONS OF THE DEFORMATION AND STRENGTH INDICATORS OF POLYMER-CONCRETE ELEMENTS OF ANNULAR CROSS SECTION

Voronezh MATERIALY XXIX NAUCH KONF. VORONEZH INZH-STROIT IN-T, 1974 [Materials of the Twenty-Ninth Scientific Conference. Voronezh Design Engineering Institute, 1974, Collection of Works] in Russian, 1975 pp 55-56

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V1237]

[Text] Experimental investigations were made of contrally compressed supports of annular cross section. The problem of the investigations involved the discovery of the deformation properties of tubular elements of FAM polymer-concrete under short-term central compression and comparing the deformation and strength properties of the tubular elements with elements of solid cross section.

The shaping of test samples was done in specially constructed equipment on a vibrostand having an amplitude of oscillations of 0.4-0.6 mm at a frequency of 3500/min. The thickness of the wall

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USSR

VORONIN, I. A., MATERIALY XXIX NAUCH KONF. VORONEZH INZH-STROIT IN-T, 1974, 1975 pp 55-56 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V1237]

of the samples was taken from the most minimal under conditions of preparation to the maximal, forming a solid cross section. Simultaneously with the tubular samples, monitoring prisms were shaped from the original mixture.

From analysis of the results of the tests it follows that the moduli of deformations both for the monitoring samples and for the samples with different thicknesses of the wall are identical. The strength depends on the thickness of the walls of the tubular elements. It was established that with decrease in wall thickness the strength of the element of annular cross section is diminished. With a wall thickness of 0.125 of the outer diameter and more the strength of the element approaches prism thickness. A formula is suggested for determining the strength of the polymer-concrete element as a function of wall thickness. Author's abstract.

USSR

VDOVICHENKO, V. B.

QUESTIONS OF COMPUTING THE OBLIQUE EXTRACENTERED COMPRESSION AND THEIR REALIZATION USING A COMPUTER

Leningrad RASCHETNO-TEOR ISSLED I PRIMENENIYE EVM V STR-VE [Computational-Theoretical Investigation and Use of a Computer in Construction, Collection of Works] in Russian, 1975 pp 26-31

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V1206 by M. I. Reytnan]

[Text] The algorithm for checking the strength of a reinforced concrete element during oblique extracentered compression is divided into several stages. First one computes the computed resistances of the concrete and the reinforcement and forms an array of contour points of the cross section. Then one determines the parameters of the equation of the neutral axis of the rod. Then one finds the area of the cross sections of the reinforcement rods and the area of the compressed zone of the concrete. At the last stage of the computation one determines the point of application of the resultants in the compressed and extended reinforcement and verifies the arrangement of the points of appli-

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USSR

VDOVICHENKO, V. B., RASCHETNO-TEOR ISSLED I PRIMENENIYE EVM V STR-VE, 1975 pp 26-31 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V1206]

cation of the external longitudinal forces and the resultant of the internal stresses on one straight line. If this condition is not satisfied, the neutral axis is turned. And finally, the strength of the cross section is verified.

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USSR

BAYMURADOV, I., FATKHULLAYEV, SH. and KHOZHMETOV, G. V.

INVESTIGATION OF THE INTERACTION BETWEEN UNDERGROUND INSTALLATIONS
AND THE SOIL BY THE METHOD OF PHOTOELASTICITY

Tashkent FUNDAMENTY I PODZEM SOORUZH PRI DINAMICH VOZDEYSTVIYAKH
[Foundations and Underground Installations Under Dynamic Effects,
Collection of Works] in Russian, Izd-vo Fan, 1975 pp 192-195

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V
921 by L. R. Stavnitser]

[Text] The possibility of studying the interaction between underground pipelines and the soil by the method of photoelasticity was proven by modeling a steel pipeline, 25 m in length and 0.75 m in diameter, laid in loess soil. The pipeline was modeled with a pipe having a length of 50 cm, a diameter of 1.5-2.5 cm and a modulus of elasticity of $1.54 \cdot 10^4$ kg/cm². The soil acted as a low-modulus optically sensitive material (igdantin) with a modulus of elasticity of 1 kg/cm², the requirements of the theory of similarity in the ratio of the elastic constants of the soil and the pipeline and the zone of contact between them being observed. During

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USSR

BAYMURADOV, I., FATKHULLAYEV, SH. and KHOZHMETOV, G. V., FUNDAMENTY I PODZEM SOORUZH PRI DINAMICH VOZDEYSTVIYAKH, 1975 pp 192-195 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V921]

the experiment the shifts for various loads were measured using indicators rigidly fastened on the ends of the pipeline model. The values of the maximal tangential stresses were determined along isochromatic lines photographed under loads of 2, 5, 10 and 15 kg. Formulas were derived for computing these stresses as well as the coefficient of shift of the pipeline. A graph was constructed of the distribution of maximal tangential stresses by laying height from the top of the pipe for various values of the longitudinal load.

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USSR

LAPIN, S. K.

COMPUTATION OF A GROUP OF FOUNDATIONS FOR HORIZONTAL OSCILLATIONS
BY ALLOWING FOR THEIR GROUP INSTALLATION

Tashkent FUNDAMENTY I PODZEM SOORUZH PRI DINAMICH VOZDEYSTVIYAKH
[Foundations and Underground Installations Under Dynamic Effects,
Collection of Works] in Russian, Izd-vo Fan, 1975 pp 58-60

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V
789 by S. S. Vyalov]

[Text] The author examines the features of computing horizontal oscillations of foundations for their group installation in the case when these foundations are loaded with a two-component amplitude force, one of which is vertical and the other horizontal. The resulting amplitude of the horizontal oscillations will be equal to the sum of the following four components: A_0 , A_1 , A_2 , A_3 , where A_0 is the amplitude of the horizontal oscillations caused by unstable forces of inertia applied to the foundation; A_1 is the amplitude of the horizontal shifts generated during the passage of longitudinal or transverse waves; A_2 is the amplitude

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USSR

LAPIN, S. K., FUNDAMENTY I PODZEM SOORUZH PRI DINAMICH VOZDEYSTVIYAKH, 1975 pp 58-60 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V789]

of the oscillations caused by the rotation of the foundation as a result of dissipation of the passing surface wave; A_3 is the amplitude of the oscillations caused by the rotation of the foundation during passage of the surface wave and by vertical shifts in the opposite edges of the foundation. The computations are compared with experimental data.

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USSR

KONYUSHENKO, A. G.

ON THE FORCE OF BULGING OF A FILM FOUNDATION IN THE INITIAL PERIOD
OF FREEZING THE SOILS OF THE BASE

Krasnoyarsk STR-VO V R-NAKH VOST SIBIRI I KRAYN SEVERA. No 35
[Construction in the Regions of Eastern Siberia and the Far North.
No 35, Collection of Works] in Russian, 1975 pp 46-56

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V
760]

[Text] The author suggests a method of computing the tangential forces of frozen bulging of a film foundation anchored in frozen soil below a layer of seasonal thawing. He assumes that the reaction of any isolated column of thawed soil of the layer of seasonal thawing is proportional to the amount of relative compression by its lower surface of the frozen layer. The reaction of the thawed soil is transmitted to the surface of the foundation through the frozen layer as through an elastic semi-infinite beam bent according to the law which is assumed to be known. It is shown that the force of bulging per unit of length of the perimeter of the foundation grows rapidly with increase in depth of

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USSR

KONYUSHENKO, A. G., STR-VO V R-NAKH VOST SIBIRI I KRAYN SEVERA. No 35, 1975 pp 46-56 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V760]

freezing in direct proportion to the increment in thickness of the frozen layer due to crystallization of the moisture, in proportion to the modulus of the overall deformation of the thawed soil in steps of three quarters and to the root of the fourth power of the modulus of elasticity of the frozen soil. References 7. Author's abstract.

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USSR

KHVOROSTOVSKAYA, N. S.

PLANE NONSTATIONARY TEMPERATURE FIELD IN A SOIL DURING ITS SURFACE
ARTIFICIAL HEATING

Krasnoyarsk STR-VO V R-NAKH VOST SIBIRI I KRAYN SEVERA. No 35
[Construction in the Regions of Eastern Siberia and the Far North.
No 35, Collection of Works] in Russian, 1975 pp 122-130

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V
759]

[Text] The author obtained a numerical solution to the two-dimensional problem of the heat effect from the surface on a large frozen ground mass for the stage of heat-free holding under a layer of heat insulation after previous isothermal heating.

She shows the possibility of using in engineering computations single quantities of thermophysical characteristics of a soil in the thawed and frozen states.

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USSR

KHVOROSTOVSKAYA, N. S., STR-VO V R-NAKH VOST SIBIRI I KRAYN SEVERA. No 35, 1975 pp 122-130 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V759]

Boundaries were established inside which the uniform solution in two-dimensional heat processes can be used with a given accuracy. Author's abstract.

2/2

USSR

UDC 620.193.4:691.58

TRINKER, B. D., SAMOKHINA, T. M., NOVGORODSKAYA, N. D., All Union Scientific Research and Planning Institute Teploproyekt, and NOVGORODSKIY, V. I., Central Scientific Research Institute for Experimental Planning of Agricultural Construction

PROTECTION OF STEEL REINFORCEMENT IN POLYMER-SILICATE SOLUTIONS (CONCRETES)

Moscow BETON I ZHELEZOBETON in Russian No. 3, Mar 76 pp 19-21

[Abstract] The behavior of steel reinforcement in polymer-silicate concretes was studied using a combined method of electrochemical investigations including measurement of electrode potentials of the steel, resistivity, capacitance and measurement of anode polarization curves. The stabilization of potentials, specific capacitance and resistivity of a cell of polymer-silicates at 18-23 C requires a long period of time (up to 100 days) and involves processes of electrochemical interaction between the steel and environment and polymer-silicate structure formation. The electrochemical state of the steel reinforcement in polymer-silicate compositions based on sodium liquid

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USSR

TRINKER, B. D., SAMOKHINA, T. M., NOVGORODSKAYA, N. D., NOVGORODSKIY, V. I., BETON I ZHELEZOBETON No. 3, Mar 76 pp 19-21

glass with a sealing additive of furyl alcohol is characterized by an increase in potentials to over - 200 mv, specific capacitance 4-8 $\mu\text{f}/\text{cm}^2$, resistivity 240-320 $\text{ohm}\cdot\text{cm}$. The surface of the reinforcement has electrochemically passive and active areas, and therefore the introduction of an anode inhibitor such as sodium nitrite is recommended.

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USSR

UDC 624.21.012.45:625.745.12

AKSEL'ROD, I. S., IVYANSKIY, M. G., POSTOVOY, YU. V., All-Union Road Planning Commission

NEW TECHNICAL VERSIONS OF REINFORCED CONCRETE BRIDGE STRUCTURES

Moscow BETON I ZHELEZOBETON in Russian No. 2, Feb 76 pp 7-9

[Abstract] Most bridges with spans of 24 to 42 meters are currently constructed of sectional beams manufactured according to plans developed in 1962-1965 and refined in later years without any basic changes. The structural and technological decisions embodied in these plans do not fully meet today's requirements for industrialization of construction and the usage of structures with increasing vehicular traffic loads. This article describes new dual-rib span structures designed for increased ease of manufacture, decreased consumption of materials and lower maintenance. During the tenth five-year plan, several bridges will be constructed with the new structures, allowing standard plans to be developed.

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USSR

UDC 624.21.012.45.093:625.745.12

SHAPIRO, D. M., SEMENKIN, A. M., KHODOS, S. M., State Institute for Road Planning

IMPROVEMENT OF THE DESIGN OF SPAN STRUCTURES FOR SMALL AND MIDDLE-SIZED MOTOR VEHICLE BRIDGES

Moscow BETON I ZHELEZOBETON in Russian No. 2, Feb 76 pp 10-11

[Abstract] Experimental designs for reinforced concrete span structures have been developed involving new types of cross sections and methods of joining sections; structural solutions have been suggested involving standardized units with high quality concrete and reinforcement. Span structures of slabs, particularly arch-shaped structures, are most promising for the next few years, as they can compete with existing structures in mass production.

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USSR

UDC 691.87:693.554:620.197:66.097.7

AKIMOVA, K. M., IVANOV, F. M., Central Scientific Research Institute
for Construction and Scientific Research Institute for Reinforced
Concrete

PROTECTION OF REINFORCEMENT FROM CORROSION BY THE USE OF INHIBITORS
IN CORROSIVE MEDIA

Moscow BETON I ZHELEZOBETON in Russian No. 2, Feb 76 pp 38-39

[Abstract] Reinforcement corrodes in structures exposed to sea water and marine atmosphere, and also in structures made of concrete containing salts of chlorine introduced to accelerate curing or improve cold resistance. Studies of the corrosion process of reinforcement in the presence of chloride ions and the influence of inhibitors on this process indicate that the most effective corrosion inhibitor is a mixture of sodium nitrite and potassium bichromate.

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USSR

UDC (691.327'8)<<313>>

MIKHAYLOV, K. V. (Scientific Research Institute for Reinforced Concrete)

PROSPECTS FOR THE DEVELOPMENT OF CONCRETE AND REINFORCED CONCRETE IN
THE USSR

Moscow BETON I ZHELEZOBETON in Russian No. 2, Feb 76 pp 19-21

[Abstract] This concluding portion of an article begun in the January issue of this Journal lists the primary areas of development of the concrete and reinforced concrete industry in the USSR over the next few years. These include massive housing construction involving larger, lighter weight but stronger reinforced concrete panels over frame structures, monolithic structures with load-bearing walls, the construction of buildings of three dimensional elements including rooms and entire apartments cast as units, rapid construction of agricultural buildings of reinforced concrete over the next 25 years, the increased use of pile foundations in civil engineering, and the use of such novelties as extremely rapid curing cements.

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USSR

UDC 691.327:666.937.6.022-413

MAT'KIN, YU. I., BOGOSLOVSKIY, S. V., BUGRIM, S. F., SLEPOKUROV, YE. I.,
Northern Affiliate of VNIIST Institute

MANUFACTURE OF WALL PANELS OF SCHUNGIZITE-GAS CONCRETE AT THE
ARKHANGEL'SK HOUSING COMBINE

Moscow BETON I ZHELEZOBETON in Russian No. 2, Feb 76 pp 22-23

[Abstract] The construction base of the Arkhangel'sk Main Construction Administration has begun producing schungizite gravel type 500 with bulk density variation factor 9.1%, cylindrical compressive strength 12 kg/cm², strength variation factor 22.8%, which is used to manufacture external wall panels 35 cm thick of grade 50 concrete. This material does not satisfy the insulation requirements, and is being replaced with gas-permeated concrete made of the same materials on equipment normally used for porous-clay-filler concrete manufacture. The new concrete can withstand over 50 cycles of freezing and thawing and has an average density of 950 kg/m³.

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USSR

UDC 691.327:69.059.2:614.84

ZHUKOV, V. V., Scientific Research Institute for Reinforced Concrete

REASONS FOR EXPLOSIVE RUPTURE OF CONCRETE IN FIRES

Moscow BETON I ZHELEZOBETON in Russian No. 3, Mar 76 pp 26-28

[Abstract] In many cases, in fires and in fire-resistance tests, early (5-20 minutes after the beginning of the fire) rupture of reinforced concrete structures is observed, in explosive form: suddenly and with a loud noise like an explosion; chunks of concrete of great mass fly outward from the structure. This may happen with even less than 3% moisture content. The reason for explosive rupture is the development of a nonequilibrium crack under the influence of compressive and tensile stresses. This type of rupture results primarily from the moisture content of the concrete, its structural porosity, composition and age, type of filler, manufacturing technology, external load (including prestressing) and boundary conditions.

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USSR

UDC 69.024.012.45.4:621.311.25:621.039

SVERDLOV, P. M., BELYANICHEV, A. K., BELOKHIN, S. L., MIKHEL'SON, L. I.,
RASSOMAKHINA, L. A., KHALYUTINA, V. N., Teploelektroproyekt; KHAYDUKOV,
G. K., KOROBOV, L. A., SPERANSKIY, I. M., FAKAYEVA, L. G., Scientific
Research Institute for Reinforced Concrete

A PROTECTIVE NUCLEAR POWER PLANT SHELL OF PRESTRESSED REINFORCED CONCRETE

Moscow BETON I ZHELEZOBETON in Russian No. 3, Mar 76 pp 32-36

[Abstract] In planning a nuclear power plant, several versions were considered: a steel shell with an outer border of reinforced concrete to act as a radiation shield; a reinforced concrete unstressed shell and a shell of prestressed reinforced concrete. Both of these versions include a metal skin on the inside for tightness of seal. For the working plan, the reinforced monolithic prestressed protective shell with stressed reinforcement placed spirally in the cylindrical portion in two directions at an angle to the horizontal plane was selected. The compliance of the floor significantly influences the bending moments at the point of its attachment to the cylinder, which must be considered in planning the structure.

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USSR

UDC 624.191.1.04:624.042.7

FOTIYEVA, N. N., Scientific Research Institute of Foundations

DESIGN OF LININGS FOR TUNNELS OF NONCIRCULAR CROSS SECTION CONSTRUCTED IN SEISMIC REGIONS

Moscow OSNOVANIYA FUNDAMENTY I MEKHANIKA GRUNTOV in Russian, No 3, May 76, pp. 21-25

[Abstract] A new approach is suggested to the problem of determination of stresses and forces in linings, based on estimation of the most unfavorable stress state in each cross section of all possible stress states with any combination of effects of long compression and shear waves and any incident angle of these waves. An algorithm is presented for the calculation, programmed for a computer and results are presented produced for the lining of the construction tunnel of the Rogunskaya Hydroelectric Power Plant.

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USSR

UDC 624.131.52

SHIROKOV, V. N., Chelyabinsk Polytechnical Institute

THEORY OF PLASTIC FLOW AND DEFORMATION OF SOIL WITH COMPLEX LOADING

Moscow OSNOVANIYA FUNDAMENTY I MEKHANIKA GRUNTOV in Russian, No 3, May 76, pp. 33-36

[Abstract] An application of an earlier suggested version of the theory of plastic flow for analysis of results of testing of sandy soil with complex load trajectories is described. The equations of the theory are extended to the case when all three invariants of the stress state change simultaneously. The basic statements of the theory suggested are confirmed: proportionality of the plastic deformation deviator, stress deviator and expansion of the loading trajectory with independent analysis of the sign of plastic deformation for each of the components. The theoretical and experimental data with different loading trajectories agree satisfactorily in all cases. A number of examples show that the theory suggested more precisely reflects the properties of soils than the theory of the nonlinearly elastic body.

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USSR

UDC 624.042.7:624.131.3

MARDONOV, B., Moscow State University

THE INFLUENCE OF WATER CONTENT OF AN ELASTIC POROUS LAYER ON THE INTENSITY OF SEISMIC WAVES

Moscow OSNOVANIYA FUNDAMENTY I MEKHANIKA GRUNTOV in Russian, No 3, May 76, pp. 42-43

[Abstract] A study is made of the process of propagation of the longitudinal waves of two types in water-saturated soil containing small quantities of air. Numerical calculations are presented showing that a slight content of air may lead to a significant decrease in the propagation velocity of type I longitudinal waves. A study is made of the problem of the transmission of unstable seismic (weak) waves through a water-saturated soil layer located between an elastic half-space and another layer. It is shown that the presence of the water-saturated layer may lead to a decrease in the amplitude at the leading edge of a refracted wave propagating in the elastic medium.

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USSR

UDC 624 539.4

KILIMNIK, L.SH.

ON DEVELOPING TECHNIQUES FOR EVALUATING THE LIMITING STATES OF MULTI-STORY FRAME BUILDINGS ACTED UPON BY SEISMIC EFFECTS

TRUDY TSNII STROITEL'NYKH KONSTRUKTSIY [Works of the Central Scientific Research Institute of Structural Parts] in Russian No 44 1975 pp 66-82

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V1166 (resume)]

[Text] The author discusses the principles of evaluating the limiting states of earthquakeproof frame buildings at two levels of seismic action. He defines concretely the concept of seismic stability in the designs of buildings and structures. He then explains the basic propositions of the technique for evaluating the limiting states and illustrates it by analyzing a 10-story building with a steel frame that is designed for a 9-ball seismic region. References 26.

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USSR

ZAVALISHIN, S. I.

INVESTIGATION OF THE STRESSED STATE OF A NEW TYPE OF SPIRAL CHAMBER

Moscow SB TR MOSK INZH-STROIT IN-T [Collected Works of Moscow Engineering Design Institute] in Russian, No 125-126, 1975 pp 146-148

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 1119]

[Text] In planning a new construction of a hydroelectric power plant by the division of hydropower plants of the Gidroproyekt imeni S. Ya. Zhuk, the suggestion was made for a new conical construction of the spiral chamber ceiling instead of a flat one. The investigations conducted by a polarization-optical method on a series of volume models permitted estimating the stressed state of the structure and the influence of the area of the columns of the stator on the operation of the installation and on the basis of the investigation results evaluating the effectiveness of the computational schemes used in determining the stresses as well. References 5. Author's abstract.

USSR

UDC 628.334.6:691.328.022-413

KARMELYUK, N. S., Ukrainian Administration for Special Construction

EFFECTIVE CONSTRUCTION OF WALLS OF REINFORCED CONCRETE CONTAINERS

Moscow BETON I ZHELEZOBETON in Russian No. 4, Apr 76 pp 9-11

[Abstract] The old series 3-900-2 precast monolithic flat panel walls for use in the construction of large vessels are being replaced with improved angle-type walls allowing a reduction in the consumption of concrete by 29%, of steel by 17.6%, of labor by a factor of 5, of labor cost by 43% and of total planned construction costs by 1.5%. An example is presented of the use of the new panels in the construction of a large above-ground container.

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USSR

UDC 691.87:693.554.004.14

OATUL, A. A., MAKSIMOV, YU. V., MARKOV, V. A., Chelyabinsk Polytechnical Institute; SOKOLOV, N. V., DMITRIYEV, V. M., Beloretsk Metalurgical Combine; SHAPIRO, A. V., LUR'YE, N. YA, Leningrad Polytechnical Institute No. 1; CHERNYY, A. S., RYABOV, V. M., Chelyabmetallurgstroy Trust; VASIL'YEV, N. F., GAVRILENKO, A. YE., Bridge Construction Trust No. 4

EXPERIENCE OF THE APPLICATION OF CABLE REINFORCEMENT IN THE CONSTRUCTION OF THE TRADE CENTER IN CHELYABINSK

Moscow BETON I ZHELEZOBETON in Russian No. 4, Apr 76 pp 18-20

[Abstract] The use of cable in place of bars as called for in the initial plan reduced the labor consumption of reinforcement operations on the construction site by 38,000 rubles. In order to eliminate labor-consuming operations involved in the protection of cables from corrosion, they must be wound of high-strength, galvanized wire with a short-term strength of 170 kg/mm² or higher. These cables have been developed by the Chelyabinsk Polytechnical Institute and the Orlov Steel-Rolling Plant for coding of wires in Minsk.

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USSR

UDC 666.9.046:666.972.16.004.14

PALIYENKO, N. I., ZAVOYSKIY, A. K., LYUBIMOVA, K. A., Reinforced Concrete Structures Plant No. 1, Kiev; CHUMAKOV, YU. M., and RATINOV, V. B., Moscow Institute of Motor Vehicles and Roads

USE OF THE ADDITIVE NNKHK IN FORCED HEAT AND MOISTURE TREATMENT MODES OF CONCRETE

Moscow BETON I ZHELEZOBETON in Russian No. 4, Apr 76 pp 20-21

[Abstract] The use of the new additive NNKHK (calcium chloride nitrite-nitrate) under production conditions has shown it to be highly effective in rapid curing of concrete by the application of heat and moisture. During steam curing, the processes of structure formation of concrete are improved, particularly in the early stages. This increases the strength of products made by both cassette and rolling technologies. The need for preliminary heating, evacuation, repeated vibration, etc. is eliminated.

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USSR

PETUKHOV, B. S., POLYAKOV, A. F., SHEKHTER, YU. L., TSYPULEV, YU. V.

STATISTICAL CHARACTERISTICS OF PULSATIONS IN TEMPERATURE AND THE TURBULENT TRANSPORT OF HEAT IN A VISCOUS SUBLAYER

Novosibirsk PRISTEN TURBULENT TECHENIYE. CH 2 [Boundary Turbulent Flow, Part 2, Collection of Works] in Russian, 1975 pp 162-177

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B162 by B. A. Kader]

[Text] The authors describe the results of an experimental study of the structure of a turbulent heat boundary layer in a viscous sublayer of a stabilized flow of air at the input heat segment of a pipe of semicircular cross section. They investigated the distribution of intensities, autocorrelations, spectral density and time scales in the viscous sublayer. They discuss the degree of possible influence of the wall material on these characteristics. They show that when the Reynolds numbers are large ($Re = 40 \cdot 10^3$) the value of this parameter influences such statistical characteristics of pulsations in temperature as dimensionless values of

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USSR

PETUKHOV, B. S., POLYAKOV, A. F., SHEKHTER, YU. L., TSYPULEV, YU. V., PRISTEN TURBULENT TECHNIYE. CH 2, 1975 pp 162-177 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B162]

the time microscale and the spectral density, but does not influence the distribution of the averaged velocity, temperature and distribution of intensity of temperature pulsations represented in dimensionless coordinates. They also mention the growth in the microscale in proportion to approach toward the wall which is associated with the more rapid damping of high-frequency pulsations in a viscous sublayer. They compare the results of measurements with the available experimental data and the results of a theoretical examination of the problem. They demonstrate that the experimental data on the mass yield for large Schmidt numbers do not allow judging as to the behavior of the coefficient of turbulent transport of heat and as to the real amount of heat yield with the corresponding values of the turbulent Prandtl number. References 17.

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USSR

UDC 536.24:536.42;669-154

DYUNDIN, V.A., DANILOVA, G.N., BORISHANSKAYA, A.V., KOZYREV, A.A.,
and DANIN, V.B.

AN EXPERIMENTAL INVESTIGATION OF HEAT EMISSION DURING THE BOILING OF
COOLING AGENTS IN PIPES WITH METAL COATINGS

Moscow KHOLODIL'NAYA I KRIOGENNAYA TEKHNIKA I TEKHNLOGIYA [Refriger-
ation and Cryogenic Engineering and Technology, Collection of Works]
in Russian, Vneshtorgizdat, 1975 pp 121-127

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B405
by T.V. Zablotskaya]

[Text] The authors present the results of their experimental invest-
igation of the boiling of different types of freon in shell-and-tube-
type vaporizers. The purpose of this work was to study the effect of
porous metal coatings that had been artificially applied to the heat-
exchange surface on the intensification of heat exchange during boil-
ing. The experimental installation was a closed circulation loop,
while F-12, F-22, and F-11 freons served as the working medium. The
experimental section consisted of 5 steel pipes in the first series
of experiments and 20 copper ones in the second series. A porous
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USSR

DYUNDIN, V.A., DANILOVA, G.N., et al., KHOLODIL'NAYA I KRIOGENNAYA
TEKHNIKA I TEKHNLOGIYA, Vneshtorgizdat, 1975 pp 121-127

coating of M3 copper was applied to the pipes' surface by metal plat-
ing. The porous layer's thickness varied from 0.075 to 0.58 mm,
while its porosity was 20-40 percent. As a result of the experiments
the authors obtained data on the effect of the investigated porous
coatings on heat emission during boiling. They point out that heat
emission in coated pipes is substantially higher than in smooth and
ribbed ones. They emphasize that the spraying (metal plating) method
makes it possible to obtain strong porous coatings that can operate
reliably in the vaporizers of refrigerating machines. The authors
also compare the results of their experiments with data given in two
American works. References 6.

USSR

UDC 621.43.011:533;621.5:533

ROZHDESTVENSKIY, YU.V.

METHODS AND TECHNIQUES FOR INVESTIGATING COMBUSTION PROCESSES IN
ROCKET ENGINES

Moscow RAKETNYYE TOPLIVA [Rocket Fuels, Collection of Works] in Russian, Izd-vo Mir, 1975 pp 171-187

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B1141 by Yu.F. Dityakin]

[Text] The author summarizes the basic directions in the development of methods for the experimental investigation of combustion processes in rocket engines. In the first section he discusses optical methods of studying intrachamber processes, and lists the existing methods utilizing still and moving picture photography to study fuel mixing and combustion processes, including intermittent burning. He also describes a method based on the use of the relationship between the optical density of the image on the film and the brightness temperature, and indicates the values of the temperature measurement errors this method entails. The author describes the use of still and moving picture photography to obtain strip photographs that are used to

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USSR

ROZHDESTVENSKIY, YU.V., RAKETNYYE TOPLIVA, Izd-vo Mir, 1975 pp 171-187

determine gas velocity. He points out several features of the optical circuits used during the still and moving picture photography of intrachamber processes. In the second section the author discusses photoelectric systems for recording the combustion process's parameters. The third section is devoted to an analysis of gas-dynamic and thermoelectric methods of measuring temperature. Here the author discusses several gas-dynamic thermometer arrangements. In the last two sections he describes several methods for measuring pressure and mixture composition. References 36.

IL'INSKIY, N. B., LABUTKIN, A. G. and SALIMOV, R. B.

SOME PROBLEMS OF EXPLOSION OF DEPTH CHARGES

TRUDY SEMINARA PO KRAYEVYM ZADACHAM. KAZANSKIY UNIVERSITET [Works of the Seminar on Boundary Value Problems. Kazan' University] in Russian No 12, 1975 pp 63-75

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V651 by P. F. Sabodash]

[Text] Within the framework of the explosion model proposed by M. A. Lavrent'yev (see M. A. Lavrent'yev, B. V. Shabat, "Problems of Hydrodynamics and their Mathematical Models, Moscow, "Nauka," 1973) an investigation is made of a number of plane two-dimensional problems on determining the cross sectional shape of the cylinder of ground thrown up when differently shaped depth charges are set off. The properties of the ground (an ideal incompressible liquid) are described by the density ρ and the critical rate of flow v_0 . A unified method based on reducing linear problems to a mixed boundary value problem of the theory of analytical functions is used to examine the inverse problem where not only the shape of the ground cylinder,

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USSR

IL'INSKIY, N. B., LABUTKIN, A. G. and SALIMOV, R. B., TRUDY SEMINARA PO KRAYEVYM ZADACHAM. KAZANSKIY UNIVERSITET, No 12, 1975 pp 63-75

but also the shape of the charge is determined. In addition, the authors solve two-dimensional problems for the case of a flat depth charge placed parallel or perpendicular to the free surface, and for a charge of square cross section. The position of the charge and its geometric dimensions are determined in the course of solving the problem.

For all the enumerated cases expressions are found in closed form for the complex flow potential dependent on the properties of the medium. On the basis of the formulas presented, numerical calculations are done on charge shape and the corresponding cylinder of ground removed that are found as a result of solution of the inverse problem. Stress-strain curves show the charge shapes and corresponding cylinders found on the basis of computational formulas for cases of horizontal and vertical placement of flat charges, and also for a charge with square cross section. The influence of initial parameters in the investigated problems is illustrated. Numerical results are found on the M-222 computer. References 7.

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IL'INSKIY, N. B. and SALIMON, R. B.

THE PROBLEM OF EXPLOSION OF A SURFACE CHARGE OF VARIABLE THICKNESS

TRUDY SEMINARA PO KRAYEVYM ZADACHAM. KAZANSKIY UNIVERSITET [Works of the Seminar on Boundary Value Problems. Kazan' University] in Russian No 12, 1975 pp 76-83

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V652 by P. F. Sabodash]

[Text] The title problem is a further development and generalization of V. M. Kuznetsov's problem on the shape of the blast funnel when a charge is set off on the surface of the ground to the case where the thickness of the charge on the surface varies linearly with respect to its width. Within the framework of the model of an ideal incompressible fluid, disregarding the strength properties of the ground, the authors formulate and solve a plane two-dimensional problem on the action of a normal pressure pulse on the boundary $y = 0$, $|x| < \infty$ of the lower half-plane $y < 0$ occupied by the ground. The width of the area acted on is equal to $2l$; the properties of the liquid are characterized by density ρ and critical rate of flow v_0 .

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USSR

IL'INSKIY, N. B. and SALIMON, R. B., TRUDY SEMINARA PO KRAYEVYM ZADACHAM. KAZANSKIY UNIVERSITET, No 12, 1975 pp 76-83

The problem is solved by a method of the theory of functions of a complex variable in which the authors reduce the solution of the initial boundary value problem to construction of an analytical function of a homogeneous Hilbert problem. In view of the difficulties that arise in constructing the function $\omega(t)$ for conformal mapping of the investigated region onto a canonical region, an approximate method of constructing the mapping function is used. The characteristic singularities of this function are determined by expansion in power series in the neighborhood of singular points. Solution of the Hilbert problem is determined with accuracy to a real constant factor that is found by a finite algebraic relation. The proposed approach gave a formula in final form for the complex velocity potential. References 7.

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USSR

UDC 629.78.048.7.001

KRIVONOS, V. A., PAVLYUCHENKO, E. N.

THE PROBLEM OF THE PERMEABILITY OF THE POROUS BARRIERS OF THE ARTERIAL
CORES OF HEAT PIPES

INTENSIFIK PROTSESSOV PERENOSA ENERGII I VESHCHESTVA V PORIST
SREDAKH PRI NIZK TEMPERATURAKH in Russian Minsk 1975, pp 38-44

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 6, 1976 Abstract No.
6.41.111 by T. A. YE.]

[Text] The best version of crosspiece, made of wire screen, is a porous structure consisting of two rigidly attached layers of screen. In this type of structure, the liquid can flow along the layers of screen over rather great distances. An increase in the number of layers of screen leads to undesirable decreases in the thermal resistance of the crosspiece. The flow of the liquid between two layers of screen occurs in a gap of very complex configuration, limited by a surface consisting of liquid menisci. The structural and hydrodynamic characteristics of porous structures are calculated. The permeability of a porous crosspiece and the maximum capillary potential created by

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USSR

KRIVONOS, V. A., PAVLYUCHENKO, E. N., INTENSIFIK PROTSESSOV PERENOSA
ENERGII I VESHCHESTVA V PORIST SREDAKH PRI NIZK TEMPERATURAKH Minsk
1975, pp 38-44

the menisci in the zone of evaporation are determined. 4 figures;
2 tables; 8 references.

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USSR

UDC 621.482:697.34

MIKHAYLOV, V.V., KOZLOV, B.K., NIKITIN, V.P., RIGER, P.N., SULTANOV, Yu. I.

SYSTEMIC APPROACH TO THE EVALUATION OF VARIANTS OF GEOTHERMAL HEAT SUPPLY

Dagestan SB. NAUCH. TR. DAGESTAN. N.-I. OTD. ENERG. M-VA ENERG. I ELEKTRIFIK. SSSR [Collection of Scientific Transactions of Dagestan Scientific Research Division of Power Engineering of the USSR Ministry of Power and Electrification] in Russian No 4 Pt 1, 1974 pp 131-139

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 2 1976 Abstract No 2S187]

[Text] Geothermal waters with temperatures of 50-100°C are distributed in an area exceeding 20% of the territory of the USSR. Using geothermal water in low-temperature heating systems with subsequent hot water supply considerably reduces the efficiency of wells and is defined as the ratio of usable heat to the total amount of heat from the wells. The efficiency can be increased by equalizing the water consumption by means of a boiler or TNU or using waste water at 20-40°C in the heat transformers. Operating experience confirms the economic

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USSR

MIKHAYLOV, V.V., KOZLOV, B.K., NIKITIN, V.P., RIGER, P.N., SULTANOV, Yu. I. SB. NAUCH. TR. DAGESTAN N.-I. OTD. ENERG. M-VA ENERG. I ELEKTRIFIK. SSSR No 4 pt 1, 1974 pp 131-139

effectiveness of the systems without additional heating and use of the heat of waste waters. To determine the indicators of the new systems, which cannot be expressed in value form (reliability, ecological factors), it is suggested that the method of expert evaluations, developed at the Power Engineering Institute imeni G.M. Krzhizhanovskiy, be used. Illustrations 1, tables 1, references 3.

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USSR

UDC 628.922.628.928

NURETDINOV, KH. N., MAKHMUDOV, K. KH. and AKHATOV, A., Tashkent Polytechnic Institute imeni A. B. Biruni

BRIGHTNESS DISTRIBUTION OF A BRIGHT SKY PROFILE CURVATURE

GELIOTEKHNICA in Russian, No 6, 1975 pp 69-73 manuscript received 5 Jan 75

[Abstract] On the basis of many years of field measurements the authors have obtained coefficients of the brightness distribution of a bright sky in the vicinity of Tashkent by allowing for its nonuniformity. These are recommended for utilization in construction work. The authors use graphs and a table to illustrate their findings. Figures 5; table 1; references 2; 2 Russian.

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USSR

UDC 621.565.945

PEREDISTAYA, R. P., Ukrainian Scientific Research Institute UkrNIIMMP and DANILOVA, G. N., Leningrad Technological Institute for the Refrigeration Industry

EXPERIMENTAL STUDY OF INTERNAL HEAT LIBERATION IN AIR COOLERS WITH LOW AMMONIA FEED RATE

Moscow KHOLODIL'NAYA TEKHNIKA in Russian, No 2, Feb 76, pp. 19-23

[Abstract] Results are presented from an experimental study of the mean heat transfer to the ammonia during boiling in horizontal tubes under forced circulation conditions. The experimental installation is described. An interpolation formula is produced for consideration of the joint influence of convection and boiling on the heat transfer coefficient to the ammonia in the area of variation of mode parameters: $q = 1600-6600 \text{ w/m}^2$; $w = 0.3-0.9 \text{ m/s}$; $p = 220-270 \text{ kPa}$.

USSR

STEN'KIN, YE. D.

DETERMINATION OF THE PARAMETERS OF A MIXTURE OF TWO GAS FLOWS BY ALLOWING FOR THE VARIABLE HEAT CAPACITY

Kuybyshev TR KUYBYSHEV AVIATS IN-TA [Works of Kuybyshev Aviation Institute] in Russian, No 67, 1974 pp 21-27

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B535]

[Text] The author formulated the problem and examined the relationships which determine the parameters of a mixed flow by allowing for the dependence of heat capacity on temperature. He developed a method for computing these parameters using nomograms of the thermodynamic π , i -functions. He cites examples of the computation. Author's abstract.

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USSR

VILENSKIY, T. V., MALKINA, YE. M. and KHZMALYAN, D. M.

COMBUSTION OF SOLID FUEL IN A SYSTEM OF PLANE PARALLEL STREAMS

Moscow TR MOSK ENERG IN-TA [Works of Moscow Power Institute] in Russian, No 269, 1975 pp 17-22

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B608 by A. N. Sekundov]

[Text] The authors solve the problem of the combustion of coal dust in a system of plane streams of air. In the equations of diffusion and energy they add source terms which characterize the presence of chemical reactions and heat release. They assumed that the particles of dust have three characteristic dimensions of 305, 95 and 7.5 micrometers. They did not consider in the work the pulsations in temperature and concentration and ignored the influence of the solid phase and heat release on the coefficients of mixing. They integrated the equations by the method of straight lines on a computer. In the work they cite the results of specific computations in the initial and transitional segment of the stream.

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USSR

KOSTERIN, V. A., DUDIN, L. A., MOTYLINSKIY, I. P., ROGOZHIN, B. A.
and KHISMATULLIN, A. YA.

EVALUATION OF THE HYDRAULIC RESISTANCE OF JET STABILIZERS OF A
FLAME

Kazan' TR KAZAN AVIATS IN-TA [Works of Kazan' Aviation Institute]
in Russian, No 182, 1975 pp 38-43

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B611]

[Text] The authors present the results of an experimental investigation of the hydraulic resistance of jet flame stabilizers. They demonstrate that for a proper evaluation of the hydraulic resistance it is necessary to take into account the energy introduced by the stabilizing jet. They propose formulas for determining the coefficient of hydraulic resistance of jet flame stabilizers. Authors' abstract.

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USSR

UDC 536.46:533.6+534.222.2

KRUPININ, V.G., and RUTOVSKIY, V.B.

ON THE CONDITIONS FOR IGNITION OF GASES THAT ARE BEING MIXED

Moscow TRUDY MOSKOVSKOGO AVIATIONNOGO INSTITUTA [Works of the Moscow Aviation Institute] in Russian No 329 1975 pp 34-41

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B508
by V.A. Levin]

[Text] The authors discuss the ignition of a jet of gaseous fuel flowing into the firing space. They investigate two cases: in the first, the highly heated fuel flows into cold air; in the second, the surrounding air is highly heated but the fuel is at a low temperature. On the basis of estimative calculations for a jet of hydrogen, they reach the conclusion that when the flowing hydrogen's temperature is 1,000-1,500°K and the air temperature is 300°K, ignition does not take place in the boundary layer. However, if cold hydrogen (300°K) flows into hot air, then ignition takes place at any temperature of the external medium that exceeds the autoignition temperature. References 5.

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USSR

GOLDAYEV, I. P., IL'INSKIY, V. V., NEFFA, YU. M. and KULALAYEV, V. V.

FEATURES OF THERMODYNAMIC COMPUTATION OF A COMBUSTION CHAMBER ON A COMPUTER BY ALLOWING FOR THE IONIZATION OF THE WORKING BODY

Khar'kov VOPR GAZOTERMODINAMIKI ENERGOUSTANOVOK. VYP 2 [Questions in Gas Thermodynamics of Energy Installations. No 2, Collection of Works] in Russian, 1975 pp 122-216

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B 1287]

[Text] The authors give an analysis of the features of a thermodynamic computation of a combustion chamber on a computer by allowing for the ionization of the working body. They show the necessity of using artificial means consisting of scaling the equation of energy conservation and in determining the temperature designation in the combustion chamber in the area of applicability of the Newton method for solving a system of equations of the equilibrium state with its arbitrarily selected initial solution. They obtained the values of the coefficient of scaling which lead to a substantial decrease in the machine time for computation on a computer. References 5. Authors' abstract.

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USSR

UDC 536.46:533.6+534.222.2

CHUCHKALOV, I. A., AVVAKUMOV, A. M., MIKHAYLOV, I. A. and NIKOLAYEV, V. N.

BASIC PRINCIPLES GOVERNING VIBRATION FLAME PROPAGATION AT VARIOUS INITIAL PRESSURES

Cheboksary FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA [Physics of Combustion and its Research Methods, Collection of Works] in Russian No 5, 1975 pp 25-32

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B508 by the authors]

[Text] The paper presents experimental data on the influence that initial pressure in a pipe has on vibration propagation of a CO-air flame. It is shown that in the investigated pressure range of 300-2000 mm Hg the ratio of the velocity of acoustic displacement to normal combustion velocity with transition to wave formation on the flame surface remains constant, the wavelengths of perturbations on the flame surface decrease with rising pressure, and phase relations between oscillations of pressure in the pipe and changes in the area of the flame surface remain identical for identical ratio of acoustic velocity and normal burning rate. References 5.

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USSR

UDC 620.193.2:[621.181:629.12]

ROMANOV, V. A., SHCHERBINKIN, V. I., DMITRIYEV, G. I.

LOW TEMPERATURE CORROSION OF THE HEATING SURFACES OF A MARINE STEAM GENERATOR

Moscow SUDOSTROYENIYE in Russian No. 4, Apr 76 pp 32-34

[Abstract] The results of testing of a steam generator indicate that combustion of type M-40 fuel oil with low excess air ($\alpha = 1.04$) can significantly reduce the rate of low temperature corrosion in the wall temperature range above 85-90 C. However, at low temperatures (below 85 C), corrosion occurs rapidly, even with low excess air factors. A hypothesis is suggested, explaining the variety of forms of low temperature corrosion curves. The frequently used term "sulfur" corrosion does not reflect all of the complexity of the corrosion processes occurring as low temperature heating surfaces are washed by the combustion products of sulfur-containing fuel. This form of corrosion should more properly be classified as low-temperature corrosion.

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USSR

MADOYAN, A. A., YUDAYEV, V. G., RYBALKO, V. K., MOROZOV, I. N., SHEREMET, P. P., BALRTYAN, V. N., and GULYA, M. P., Southern Division, F. E. Dzerzhinskii All-Union Heat Engineering Institute; Mironov State Regional Electric Power Station

MORE ECONOMICAL COMBUSTION OF MIXED SOLID AND LIQUID FUEL

Moscow ENERGETIK in Russian No. 1, Jan 76 pp 29-31

[Abstract] The increasingly variable electrical load cycles and the need for regulating the performance of steam generators over wider ranges of operation have raised the fraction of heavy oil in the overall fuel demand by the thermoelectric power generation system of the Ukrainian SSR. The model TP-230 boilers at the Mironov Power Station generate each 230 tons/h of steam at 510°C and 110 kgf/cm² pressure with an active volume of the fuel chamber equal to 1210 m³. The burners here, designed for grade ASh solid fuel, are less efficient when the latter is mixed with 20-22% heavy oil. The combustion of coal dust and heavy oil together was studied and the burner design was modified, for the purpose of improving the performance in terms of minimum incomplete combustion and minimum heat loss via flue gases. The goal has been achieved by localizing the jets of heavy oil with 0.95-1.00 excess air and the jets of coal dust with 1.15-1.20 excess air in separate zones of the furnace. Figures 2.

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USSR

STUROVA, I. V.

WAVE MOVEMENTS ARISING IN A LIQUID WITH GRADUAL STRATIFICATION DURING FLOW AROUND A SUBMERGED BODY

Novosibirsk CHISL METODY MEKH SPLOSH SREDY, T 6, No 3 [Numerical Methods of Mechanical Solid Media, Vol 6, No 3, Collection of Works] in Russian, 1975 pp 148-160

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B43 by A. K. Nikitin]

[Text] In linear formulation the author examines the stationary spatial problem about waves arising in a three-layer unbounded ideal liquid with flow by a uniform current around a submerged source and effluence. The unperturbed flow of ideal incompressible liquid, flowing in the positive direction of the x axis at a constant velocity V , consists of an upper layer of density ρ_1 , occupying the area $y > H$, a middle layer of thickness H and density $\rho_2 = \rho_1 (1 + \epsilon_1)$ and a lower layer of density $\rho_3 = \rho_2 (1 + \epsilon_2)$, occupying the half-space $y < 0$ ($\epsilon_1, \epsilon_2 > 0$). The x and z axes are arranged on the unperturbed horizontal surface of the interface between the middle and the lower layer.

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USSR

STUROVA, I. V., CHISL METODY MEKH SPLOSH SREDY, T 6, No 3, 1975 pp 148-160 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B43]

The source and the effluence of equal power m are arranged on a straight line, parallel to the axis x , at a distance of $2a$ from one another, the axis y passes through the middle of this distance and is directed vertically upward. The author examines two cases of the arrangement of source and effluence: (1) in the middle layer when $y = h$; (2) in the lower layer when $y = -h$. The movement of the liquid is assumed to be eddy-free and the velocity potential in the n -th layer is sought in the form $\Phi_n = Vx + \phi_n(x, y, z)$.

A double Fourier transform over x and z with infinite limits is used for solution to the problem. The integral representation for raising the free surface is found. The integrals are investigated by the method of the stationary phase for large values of $r = \sqrt{x^2 + z^2}$. Numerical computations are given whose results are presented on graphs. Then the author examines the partial case of a two-layer liquid. References 5.

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USSR

NAKORYAKOV, V. YE., POKUSAYEV, B. G., SHREBER, I. R., KUZNETSOV, V. V. and MALYKH N. V.

EXPERIMENTAL INVESTIGATION OF SHOCK WAVES IN A LIQUID WITH GAS BUBBLES

Novosibirsk VOLNOVYYE PROTSESSY V DVUKHFAZ SISTEMAKH [Wave Processes in Two-Phase Systems, Collection of Works] in Russian, 1975 pp 54-97

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B211 by V. P.]

[Text] The authors describe experimental devices, the method of investigation and the results obtained (they give graphs and oscillograms). The shock waves were investigated in water and in a mixture of glycerine and water. The gas bubbles were created by blowing nitrogen through 120-micrometer diameter capillaries.

The experimental program included measurement of the rate of propagation of the shock wave with a pressure gradient on the front p_2/p_1 from 1.09 to 3.3 in a medium with a volume content of gas of $\varphi = 10^{-2}$ -5.05.10⁻² and kinematic viscosity of the liquid of $\nu = (2-34) \cdot 10^{-6}$ m²/sec.

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USSR

NAKORYAKOV, V. YE., POKUSAYEV, B. G., SHREBER, I. R., KUZNETSOV, V. V. and MALYKH, N. V., VOLNOVYYE PROTSESSY V DVUKHFAZ SISTEMAKH, 1975 pp 54-97 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B211]

10^{-6} m²/sec; an investigation of the structure of the shock wave with parameters $p_2/p_1 = 1.36-1.77$, $\varphi = (0.78-4.7) \cdot 10^{-2}$, radius of bubbles $R = (0.1-0.75) \cdot 10^{-3}$ m; measurement of the rate of propagation of the head of the wave of dilatation and investigation of its structure in a gas-liquid medium with parameters $p_1 = 1-3$ bar, $\varphi = 10^{-2}-10^{-1}$, $\nu = (1-34) \cdot 10^{-6}$ m²/sec; investigation of the frontal collision of shock waves with $p_2/p_1 = 1.64-2.05$, $p_3/p_1 = 1.33-1.71$, $\varphi = (0.7-3.06) \cdot 10^{-2}$; investigation of the interaction of shock waves propagating after one another with $p_2/p_1 = 1.49-2.0$, $p_3/p_2 = 1.34-1.7$, $\varphi = (0.7-2.9) \cdot 10^{-2}$.

A brief analysis is given of the experimental data. References 18.

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USSR

UDC 624:539.4

MALYSHEV, L.K., and SHUL'MAN, S.G.

ON DESIGNING MASSIVE STRUCTURES ACTED UPON BY SEISMIC EFFECTS

IZVESTIYA VNII GIDROTEKHNIKI [Bulletin of the All-Union Scientific Research Institute of Hydraulic Engineering] in Russian No 108 1975 pp 168-178

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V1165 (resume)]

[Text] The authors present the results of research into the stress-deformed state of a massive hydraulic engineering structure subjected to seismic actions. For a rectangular block on an elastic base, they discuss various approaches within the framework of the plane problem. They make a theoretical determination of the block's stress-deformed state by methods from the static and linearly spectral theories of seismic stability and analog accelerogram and stress wave propagation calculations. For the latter case, experimental investigations were also carried out, by the polarization-optical and interferometric methods. The authors discuss variants of vertical and horizontal seismic effects. They compare and analyze the block's stressed
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USSR

MALYSHEV, L.K., and SHUL'MAN, S.G., IZVESTIYA VNII GIDROTEKHNIKI No 108 1975 pp 168-178

states, as determined by the methods listed above, and show that the opening phase described by the wave approach is characterized by a stressed state that is not allowed for in the existing theories of seismic stability. References 10.

USSR

NIKITIN, A. K. and TALDYKIN, YE. I.

ON WAVES ON THE SURFACE OF A VISCOUS FLUID OF FINITE CONSTANT DEPTH
IN THE PRESENCE OF A VERTICAL WALL

Novocherkask TR NOVOCHERKAS INZH-MELIOR IN-TA [Works of Novocher-
kask Engineering and Land Reclamation Institute] in Russian, Vol 16,
No 6, 1975 pp 212-216

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B30
by I. P. Oborotov]

[Text] The authors examine in linear formulation the problem of
two-dimensional waves on the surface of a heavy viscous incompres-
sible fluid of finite constant depth in the presence of a vertical
wall. After setting the origin of the Cartesian coordinate system
at the point of intersection of the unperturbed free surface and
the wall and directing the z axis vertically upward, and the x axis
to the right, i.e., to the side of the wave propagation, the auth-
ors examine the movement in the area $x \leq 0$.

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USSR

NIKITIN, A. K. and TALDYKIN, YE. I., TR NOVOCHERKAS INZH-MELIOR
IN-TA, Vol 16, No 6, 1975 pp 212-216 [From REFERATIVNYY ZHURNAL,
MEKHANIKA No 6 1976 Abstract No 6B30]

The projections of velocity v_{x1} , v_{z1} and pressure p_1 , generated
because of the travelling nondamping progressive waves, are se-
lected in such a manner that they satisfy the linearized Nav'ye-
Stokes equations. The reflected waves, damping when $x \rightarrow -\infty$, ex-
cite the projections of velocity v_{x2} , v_{z2} and pressure p_2 , which
must also satisfy the original equations. On the strength of the
linearity of the problem of the velocity field and the pressure
field caused by the presence of the oncoming and reflected waves
are determined by the following relationships: $v_x = v_{x1} + v_{x2}$,
 $v_z = v_{z1} + v_{z2}$, $p = p_1 + p_2$. For these resulting parameters the
boundary conditions are also satisfied (absence of tangential
stresses on the free surface, adhesion of the fluid to the bottom
and wall). Assuming that the reflected waves have the same period
of oscillations as the oncoming ones, and there are equal ampli-
tudes at the wall, the authors find the length of these waves and
the parameters v_{x2} , v_{z2} and p_2 after applying the Fourier sine

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USSR

NIKITIN, A. K. and TALDYKIN, YE. I., TR NOVOCHERKAS INZH-MELIOR
IN-TA, Vol 16, No 6, 1975 pp 212-216 [From REFERATIVNYY ZHURNAL,
MEKHANIKA No 6 1976 Abstract No 6B30]

transform over the variable z to the original equations with subsequent conversion. In sum, they obtained in finite form a comparatively simple equation for the free surface.

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USSR

AKHBERDIYEV, A., LEVSH, I. P., MOLDABEKOV, SH. M., NIYAZOV, M. I.,
Editing Staff of the Uzbek Chemical Journal, Uzbek SSR Academy of
Sciences

HYDRAULIC RESISTANCE IN A LAYER OF A PSEUDOLIQUEFIED SPRINKLING
NOZZLE AT HIGH GAS VELOCITIES

Tashkent GIDRAVLICHESKOYE SOPROTIVLENIYE V SLOYE PSEVDOLIQUEFIED SPRINKLING
OROSHAYEMOY NASADKI PRI BOL'SHIKH SKOROSTYAKH GAZA [Hydraulic Resistance in a Layer of a Pseudoliquefied Sprinkling Nozzle at High Gas Velocities] in Russian, 1976, 7 pp [Manuscript Deposited at the All-Union Institute of Scientific and Technical Information, 11 Mar 76, No 747-76Dep]

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 3B623
DEP]

[Text] Investigations were conducted on a laboratory setup consisting of a column with a diameter of 390 mm. Polymer rings 31 X 31 X 4 in size and a weight of 13.5 g each were used as the nozzle. The initial height of the layer of the nozzle was $H_0 = 15$ cm, the speed of the gas and the density of sprinkling varied in a range, respectively, of $W = 3-11$ m/sec, $L = 0.8$ m³/m²·hour. Dependences were given of the hydraulic resistance on gas velocity

USSR

AKHBERDIYEV, A., LEVSH, I. P., MOLDABEKOV, SH. M., and NIYAZOV, M. I., GIDRAVLICHESKOYE SOPROTIVLENIYE V SLOYE PSEVDOOZHIZHENNOY OROSHAYEMOY NASADKI PRI BOL'SHIKH SKOROSTYAKH GAZA, 1976, 7 pp, 11 Mar 76, No 747-76Dep [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B623DEP]

and density of sprinkling, and also the results of computations of porosity of the layer, the real gas velocity and the coefficient of resistance. The investigations on cleaning dust from industrial gases show that with increase in hydraulic resistance of the apparatus the degree of cleaning is increased. Thus, with a hydraulic resistance of $\Delta P = 150$ mm water column at a velocity of $W = 11$ m/sec the degree of cleaning reached 99.3%. Authors' abstract.

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USSR

MAMASAKHLISI, V. M.

DETERMINATION OF THE STABILIZATION TIME AND AMOUNT OF EROSION OF A SHORE IN A RANGE CONSTRICTED BY TRANSVERSE BARRIERS

TR GRUZ POLITEKHN IN-T [Works of the Georgian Polytechnic Institute] in Russian, No 2(175), 1975 pp 100-103

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1120 by L. G. Rabukhin]

[Text] According to the data of 12 authors cited in the article the stabilization time T of erosion of the bottom in a range constricted by transverse barriers comprises from 5 to 300 min. The author gives a formula for determining T obtained by I. V. Dolidze on the basis of the dependence of T_s . Ye. Mirtskhulav for establishing the fatigue strength of argillaceous soils for erosion. The author cites tests on a model in which the transverse spur with a length A is established at an angle of 90° to the uneroded side of the flume. He determines the maximal width of the erosion x , the distance l from the point of maximal erosion to the range of the barrier and the stabilization time of the erosion T . He

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USSR

MAMASAKHLISI, V. M., TR GRUZ POLITEKHN IN-T, No 2(175), 1975 pp 100-103 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1120]

obtains the dependence

$$x = (A - A_{cr}) \frac{(1 + Fr)^2}{(1 + n_{cr})^3}$$

where A_{cr} is the critical length of the barrier when the eroded shore opposite the spur is found in the state of limiting equilibrium, $n_{cr} = A_{cr}/B$ is the critical coefficient of constriction, B is the width of the channel, Fr is the Froude number. He gives the dependence for determining l , the size of l diminishing with increase in length A . Proceeding from the assumption that at the initial moment of erosion the speed of the flow is proportional to $n - n_{cr}$, and the allowable speed is proportional to $1 - n_{cr}$ (where $n = A/B$), he finds the dependence

$$T = 10^3 \frac{B+x}{v} \sqrt[4]{\frac{n - n_{cr}}{1 - n_{cr}}}$$

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USSR

MAMASAKHLISI, V. M., TR GRUZ POLITEKHN IN-T, No 2(175), 1975 pp 100-103 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1120]

(v is the rate of flow). The author mentions that the recommended dependences give good agreement with the test results.

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ALEKSANDROVSKIY, A. A., KOSTERIN, A. V., SHARAFUTDINOV, V. F. and LEONT'YEV, A. N.

CONCERNING MOTION OF A LIQUID FILM RELATIVE TO A RAPIDLY ROTATING ROTOR

TRUDY SEMINARA PO KRAYEVYM ZADACHAM. KAZANSKIY UNIVERSITET [Works of the Seminar on Boundary-Value Problems. Kazan' University] in Russian No 12, 1975 pp 19-24

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B632 by L. T. Chernyy]

[Text] The authors investigate the problem of motion of a film of incompressible fluid conforming to the rheological law

$$T_{ij} = -p\delta_{ij} + 2\eta(\sqrt{2E\rho q E_{\rho q}}) E_{ij} \quad (1)$$

where the T_{ij} , E_{ij} , δ_{ij} are components of the tensors of stresses, strain rates and metrics, and p is pressure. Motion takes place on the surface of a turning rotor. The general equations of mechanics of a continuous medium are simplified with consideration of typical peculiarities of the flow, after which rheological law (1) is taken into account. An expression is obtained

1/2

USSR

ALEKSANDROVSKIY, A. A., KOSTERIN, A. V., SHARAFUTDINOV, V. F. and LEONT'YEV, A. N., TRUDY SEMINARA PO KRAYEVYM ZADACHAM. KAZANSKIY UNIVERSITET, No 12, 1975 pp 19-24

for determining film thickness δ_0 as a function of R (distance from the axis of the rotor measured along its surface). This equation is solved in the case where the Williamson law

$$\eta = \frac{A}{B + \sqrt{2E\rho q E_{\rho q}}} + \eta_\infty \quad (2)$$

holds. The theoretically found dependence $\delta_0(R)$ is compared with measurements of the thickness of a film of 8% solution of sodium salt of carboxymethyl cellulose in experiments done by the authors. The results show satisfactory agreement.

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USSR

KOLOVANDIN, B. A., BULAVKO, A. A., DMITRENKO, YU. M. and LUCHKO, N. N.

INVESTIGATION OF THE SIMPLEST STATISTICAL CHARACTERISTICS OF THE VELOCITY FIELD OF A TURBULENT FLOW

Novosibirsk PRISTEN TURBULENT TECHENIYE. CH 1 [Boundary Turbulent Flow. Part 1, Collection of Works] in Russian, 1975 pp 152-164

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B116 by Ye. B. Gladzer]

[Text] The authors examine equations for the averaged square of velocity pulsations and vorticity of pulsations of velocity in which appear the unknown quantities with two-point second and third moments. In a uniform isotropic turbulence these quantities are investigated from the viewpoint of satisfying the equations by classical laws of degeneration in the limiting cases of large and small values of the local Reynolds number. For a nonisotropic axisymmetrical turbulence in the case of large Reynolds numbers the the investigated quantities are determined experimentally and their agreement with the limiting cases under conditions of uniformity are proven. Several results of the experiments are cited.

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USSR

GORELOV, G. M.

HYDRAULIC CHARACTERISTICS OF HEAT EXCHANGERS DURING THE FLOW OF A TWO-PHASE LIQUID

Kuybyshev TR KUYBYSHEV AVIATS IN-TA [Works of Kuybyshev Aviation Institute] in Russian, No 67, 1974 pp 156-167

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B536]

[Text] The author gives analytical expressions for the hydraulic losses of a two-phase flow as a function of the pressure of the mixture and the vapor content. He examines the flow of a two-phase liquid in a cylindrical channel with various laws for the supply of heat. He demonstrates the influence on the form of the characteristics and on the stable operation of a heat exchanger of these factors such as choking at the input and output, the degree of overheating of the flow at the input, the amount of heat supplied and its change along the length. References 12. Author's abstract.

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USSR

MORDASOV, A. P.

HYDRAULIC JUMP IN A DRAIN CONDUIT BEHIND AN EDDY GATE

Moscow SB TR MOSK INZH-STROIT IN-T [Collection of Works of Moscow Engineering Design Institute] in Russian, No 122, 1975 pp 68-73

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B855 by V. B. Dul'nev]

[Text] The author gives the results of an experimental investigation of the movement of a fluid in a horizontal cylindrical conduit behind an eddy gate in regimes for which an annular hydraulic jump is formed in the middle of the conduit. The investigations were conducted on a model device with a conduit having a diameter $D = 50$ mm and a length $L = 12D$ with pressures $H \leq 200$ m, velocities of the fluid $v \leq 60$ m/sec and supports on the side of the downstream water $h \leq 20$ m. The author gives the characteristics of the water stream in the conduit in front of the jump and behind it for several different positions of the blades the eddy gate and for different values of H and h . He gives the reasons for the disappearance of the annular hydraulic jump or the formation of a "jump-wave" with significant increase in the length of the conduit ($L = 100D$).

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USSR

STEN'LIN, YE. D.

METHOD OF EVALUATING STATIC AND DYNAMIC PROPERTIES OF A PNEUMATIC SYSTEM OF CONTROLLING THE REGIME OF OPERATION OF A GAS TURBINE ENGINE

Kuybyshev TR KUYBYSHEV AVIATS IN-TA [Works of Kuybyshev Aviation Institute] in Russian, No 67, 1974 pp 35-45

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B1032]

[Text] The author formulates the problem of studying a system that is necessary for control of a gas turbine engine during its operation under conditions of an unbalanced flow at the input. He develops a method of determining the parameters of the system and particularly the pressure in the receiver in steady-state and transitional regimes. He establishes a formula for feedback which ensures programming of the given problem for its solution with the aid of a computer. He cites an example of the computation. The materials of the article may be used in the process of creating gas turbine engines. Author's abstract.

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USSR

UDC 532.5:627

NAM, K.S.

RESEARCH IN THE FLOW-PAST OF PRISMATIC BODIES IN THE PRESENCE OF SIGNIFICANT NARROWING OF THE WATER CURRENT'S CROSS SECTION

Moscow TRUDY MOSKOVSKOGO GIDROMELIORATIVNOGO INSTITUTA [Works of the Moscow Institute of Water Reclamation] in Russian No 42 1975 pp 107-114

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B1007 (resume)]

[Text] The author presents data on the resistance coefficients of prismatic bodies with a rectangular cross-section (side ratios $b/a = 0.1, 1.62, 2.0$, and 3.0 , and extensions $\lambda = b/a = 3.57$ and 9.27) during flow-past near a free surface in a constricted flow. The experiments were conducted in hydraulic and hydraulic engineering chutes for Reynolds numbers $Re_a = 0.9 \cdot 10^4 - 2.4 \cdot 10^4$ and Froude numbers $Fr = 0.007 - 0.125$. References 9.

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7

USSR

UDC 532.5:627

ZHURAVLEVA, A.G., and LYSENKO, P.YE.

RESEARCH IN THE FLOW-PAST OF WATER-PASSAGE STRUCTURE IN THE PRESENCE OF A TECHNOLOGICAL "WAVE"

Moscow TRUDY MOSKOVSKOGO GIDROMELIORATIVNOGO INSTITUTA [Works of the Moscow Institute of Water Reclamation] in Russian No 43 1975 pp 111-118

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B1008 (resume)]

[Text] The authors explain the results of their investigation of the flow-past by a high-speed flow of the elements of hydraulic engineering structures that have a technological "wave" not provided for in the plan. They present a theoretical solution of the problem of determining the additional pressure arising in the presence of the "wave" that they obtained by using the general equation of the dynamics of a viscous liquid in Helmholtz's form. They discuss different cases of liquid movement and boundary conditions. The authors compare the additional pressures, as determined theoretically for a potential current, with experimentally obtained values.

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USSR

UDC 539.3

CHILINGARISHVILI, G.I.

A TYPE III BOUNDARY CONDITION DURING THE SOLUTION OF THERMAL CONDUCTIVITY PROBLEMS BY THE METHOD OF NETS

TRUDY KOORDINATSIONNOGO SOVESHCHANIYA PO GIDROTEKHNIKE [Works of the Coordinating Council on Hydraulic Engineering] in Russian No 103 1975 pp 245-252

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V110 (resume)]

[Text] On the basis of an analysis that he made with the help of a surface layer net modulus that he himself introduced, the author proposes formulas for determining surface temperatures in both the presence and absence of heat generation inside a body. These formulas provide the best approximation to exact solutions for given thermophysical coefficients and net parameters. Using numerical examples, the author gives an estimate of the error involved. References 10.

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USSR

UDC 624.012:539.4

CHILINGARISHVILI, G.I., and CHICHAGUA, P.V.

INITIAL STRESSES ON THE FACES OF A DAM DURING SURFACE COOLING DURING THE CONCRETE-SETTING PROCESS

TRUDY KOORDINATSIONNOGO SOVESHCHANIYA PO GIDROTEKHNIKE [Works of the Coordinating Council on Hydraulic Engineering] in Russian No 103 1975 pp 256-259

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V1204 (resume)]

[Text] The authors present the results of experimental and theoretical investigations of the thermally stressed state of a hardening concrete mass during surface cooling and natural cooling under conditions of heat exchange with the air. They point out the possibility of significant compression of the masonry on the dam faces through surface cooling and an early increase in concrete hardening, which increases fracture resistance and improves the structure's operating qualities. References 8.

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USSR

NALETOV, V. V.

ON SEVERAL PROPERTIES OF TWO-DIMENSIONAL TURBULENCE

Kiev VOPR MGD-PREOBRAZOVANIYA ENERGII. VYP 2 [Questions of MHD-Energy Conversion, No 2, Collection of Works] in Russian, Izd-vo Nauk Dumka, 1975 pp 85-90

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B119 by Ye. B. Gledzer]

[Text] The author states that in a two-dimensional non-heat conducting fluid the invariant of motion of each elementary volume is, in addition to the mean square of temperature, also the mean square of the temperature gradient under conditions of statistical uniformity. In analogy with the known hypotheses of cascades of energy and entropy it is assumed that a cascade process of transmitting the square of the temperature gradient to small scales is possible. The corresponding spectral law k^{-3} characterizes the segment of the spectrum with large k . With small wave numbers the ordinary inertial-convective range is found with the law $k^{-5/3}$. The author discusses the possibilities of deriving several relationships for the second moments of the fields of velocity and temperature for the final period of degeneration of the uniform two-dimensional heat conducting fluid.

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USSR

IVANOV, V. P.

EXPERIMENTAL INVESTIGATIONS OF THE COMBINED MOVEMENT OF TWO FLUIDS ALONG A HORIZONTAL CONDUIT

TR GOS IN-T PO PROYEKTIR I ISSLED RABOTAM V NEFT PROM-STI "GIPRO-VOSTOKNEFT'" [Works of the State Institute for Planning and Research in the Petroleum Industry "Giprovostokneft'"] in Russian, No 24, 1975 pp 67-73

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1057]

[Text] The author gives the results of experiments on the combined flow of oil-water and petroleum-water systems along a horizontal conduit on laboratory and industrial test benches. As a result of the investigations carried out he establishes the interrelationship between the speed of the mixture, the ratio of components, the position of the interface and the gradient of hydraulic resistances. He gives the basic structures of the shape of the flow in the horizontal conduit: flow with the sublayer and emulsion flow. He determines that reduction in the gradient of the hydraulic resistances takes place with contents of the light component of $\beta = 0.4-0.6$. References 5. Author's abstract.

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USSR

DUPLYAK, V. D.

ON THE EFFLUX FROM UNDER A VERTICAL GATE IN THE PRESENCE OF A
DRIFT FLOW IN THE PLANE OF THE OPENING

GIDRAVLIKA I GIDROTEKHN. RESP MEZHVED NAUCH-TEKHN SB [Hydraulics
and Hydrotechnology. Republic Interdepartmental Scientific and
Technical Collection] in Russian, No 22, 1976 pp 44-48

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1123]

[Text] The author examines the question of the influence of a
drift current on the throughput of a gate located on the side chan-
nel at an angle of $\pi/2$. He gives graphs for determining the coef-
ficient of flow of the gate as a function of the relative opening
of the gate and the sizes of the flow rate ratios obtained by pro-
cessing the experimental data. He describes the method and gives
formulas for computing the throughput of the gate in the presence
of a drift flow. Author's abstract.

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USSR

LAYGNA, K. YU.

ON THE CONDITIONS OF FORMATION OF STRUCTURAL MOTION OF AIR IN
CHAMBER BLOCKS

FIZ-TEKHN PROBL RAZRABOTKI POLEZN ISKOPAYMYKH [Physico-Technical
Problems in the Treatment of Minerals] in Russian, No 6, 1975 pp
147-150

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B
1280 by V. I. Bogomazov]

[Text] The author presents the results of an experimental invest-
igation of the physical pattern of motion of chamber flows on hy-
dromodels and in nature. It is shown that the character of the
flow in the models substantially depends on the Reynolds number
 Re_{ed} computed from the equivalent diameter of the connections.
A jet flow is formed when $Re_{ed} > 0.4 \cdot 10^5$. A complex aerodynamic
intereffect arises between connections when $Re_{ed} < 0.4 \cdot 10^5$, as a
result of which air recirculation occurs. The natural investiga-
tions confirmed the correctness of the conclusions made in test-
ing on models.

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USSR

UDC 532.5:532.135

GUBIN, V. YE. and KUTUKOV, YE. G.

LAMINAR-TO-TURBULENT TRANSITION IN STRATIFIED FLOW OF EMULSIONS IN PIPELINES

TRUDY VSESOYUZNOGO NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA PO SBORU, PODGOTOVKE I TRANSPORTU NEFTI I NEFTEPRODUKTOV [Works of the All-Union Scientific Research Institute on Collection, Processing and Transportation of Petroleum and Petroleum Products] in Russian No 13, 1975 pp 28-32

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B653 by A. I. Ivandayev]

[Text] An expression is derived for the characteristic Reynolds number of a flow of emulsion with stratified motion in a pipeline. This expression is used for analyzing experimental data on the laminar-to-turbulent transition of emulsion flow. It is established that the value of the given critical Reynolds number is 2000-2400, i. e. it corresponds to the critical number for flows of homogeneous liquids. It is shown that correct analysis of experimental data is impossible without consideration of flow structure.

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USSR

UDC 532.542

RABINOVICH, M. I.

A TECHNIQUE FOR COMPUTER CALCULATION OF UNSTEADY MOTION IN COMPLEX LINEARIZED HYDROSYSTEMS WITH DISTRIBUTED AND LUMPED PARAMETERS

Moscow MEKHANIKA MASHIN [Mechanics of Machines, Collection of Works] in Russian No 49, "Nauka," 1975 pp 22-31

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B784 by the author]

[Text] A procedure is given for computer calculation of unsteady motion in a complex branched hydrosystem with lumped and distributed parameters, in particular by replacement with an equivalent scheme with lumped parameters. The use of matrix methods enabled compact notation and facilitated construction of the computational algorithms. Methods of the topological theory of graphs are used, enabling conversion of the geometric structure of schemes of the hydrosystems to algebraic form, and facilitating the setting up of matrix equations for a complex branched hydrosystem. A description is given of the flowchart of the program for computer calculation of frequency responses and forced oscillations of pressure and flowrate in such a hydrosystem. References 10.

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Industrial

USSR

UDC Δ 621.9.06.002: Δ 65.011.51

SHELKOVYI, K. I., Director, S. V. Kosirop Machine-Tool Works in Kharkov

MECHANIZED PRODUCTION AT THE KHARKOV MACHINE-TOOL WORKS

Moscow MEKHANIZATSIYA I AVTOMATIZATSIYA PROIZVODSTVA in Russian No. 1, Jan 76
pp 19-21

[Abstract] The S. V. Kosirop Works in Kharkov specialize in the production of special-purpose circular grinders for parts ranging from 20 to 2000 mm in diameter and 0.5-12 m long. Both fully and semiautomated models are built, of a technico-economic quality at least as high as that of most foreign makes. The plant is managed in accordance with Party guidelines and planning. During the ninth Five-Year-Plan, following the 24th Party Congress, the S. V. Kosirop Works have contributed to a 25.2-62.8% increase in industrial output within the various product categories. The labor productivity has increased by 41.6% over the same period, and several important engineering-management improvements have been instituted. To keep up with the increasing complexity of the equipment and the increasing number of different models produced (already 11-110 and 10-12 added each year), a production control system has been installed with a MINSK-22 computer and two data processors as its central components. This system can handle 35 problems in the 5 areas of: manufacturing engineering, technico-economic planning, materials and tooling, accounting, and production flow. The mechanization of casting, heat treatment, machining, loading, transporting, unloading, and storing operations

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USSR

SHELKOVYI, K. I., MEKHANIZATSIYA I AVTOMATIZATSIYA PROIZVODSTVA No. 1, Jan 76
pp 19-21

has replaced much labor and thus resulted in appreciable cost savings. Much attention is paid to continuous and phased equipment modernization. Much is still to be done in the area of mechanization, and to be accomplished during the next Five-Year-Plan. Figures 3.

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USSR

UDC 662.997.004.14

SALIYEVA, R. B., Tashkent Electrotechnical Institute of Communication

DESIGN PRINCIPLES OF HELIO POWER AND WIND POWER SYSTEMS

Tashkent GELIOTEKHNKA in Russian No 1, 1976 pp 51-57 manuscript received 14 Feb 75

[Abstract] The author examines a systems approach to planning the design of helio power and wind power systems in which the natural atmosphere, technical tools and people participate. Such systems are quite complex and possess five criteria. They must have the presence of goals for the functioning of the system, control in the system, a hierarchical structure of the system, continuous variation in the state of the subsystems and its elements and the requirement for utilization of electronic digital computers for solving all optimization problems. Figures 3; references 15: 15 Russian.

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USSR

UDC 621.822.5.032

PINEGIN, S. V., SEMENOV, A. P., TABACHINKOV, YU. B., GRIGOROV, A. I.

TECHNOLOGY FOR MANUFACTURE OF GAS DYNAMIC CHANNELS ON STEEL AND CERAMIC BEARINGS BY ION ETCHING

Moscow VESTNIK MASHINOSTROYENIYA in Russian No. 2, Feb 76 pp 61-65

[Abstract] Treatment processes based on the phenomenon of atomization of materials upon ion bombardment (ion etching) under a vacuum, already in use in the microelectronic industry, seem promising for creation of the relief required on the surface of gas bearings. The processes described and a photograph of an attachment for ion bombardment of gas dynamic channels in thrust bearings is presented. A photograph is also presented of steel and ceramic thrust bearings with the grooves thus produced. The technology developed allows highly accurate cutting of gas dynamic channels of aerodynamically optimal outline in steel and ceramic thrust bearings.

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USSR

UDC: 664.037.5

VOSKOBOYNIKOV, V. A., All-Union Scientific Research Institute for the Canning and Vegetable Drying Industry, Kaukhcheshvili, E. I., Moscow Technological Institute for the Meat and Milk Industry, OZIRNAYA, D. I., All-Union Scientific Research Institute for Electromechanics

INTENSIFICATION OF THE PROCESS OF FREEZING OF FOOD PRODUCTS AND BIOLOGICAL MATERIALS IN A MAGNETIC FORCE FIELD

Moscow KHOLODIL'NAYA TEKHNIKA in Russian, No 2, Feb 76, pp. 44-46

[Abstract] An attempt is made to intensify the process of crystallization of water by acting on the internal structure of tissues with magnetic fields, controlling the process of crystallization and reducing irreversible changes upon low temperature conservation of food products and biological materials. The intensification of the process of freezing of food products in biological materials by application of the field of a permanent magnet to the objects can be considered an established fact.

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USSR

UDC 621.9.06-529-192

STARODUBOV, V. S., Candidate of Technical Sciences and UKOLOV, M.S.

ON THE QUESTION OF TECHNOLOGICAL RELIABILITY OF METAL CUTTING TOOLS WITH NUMERICAL PROGRAMMED CONTROL

Moscow NADEZHNOST' I KONTROL' KACHESTVA in Russian No 5 1976 pp 18-23

[Abstract] The authors are concerned in this article with the question of technological reliability of metal cutting tools. They examine the features of tools with numerical programmed control from the viewpoint of their technological reliability. They give the structural diagram for analyzing the technological reliability of a drilling tool with numerical programmed control and give the results of investigations on the geometrical accuracy and temperature deformations by analyzing their influence on the accuracy of the tool operation. Figures 2.

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USSR

UDC 658.512.6-55:658.562.012.7

BASHKANSKIY, E. G., Candidate of Physico-Mathematical Sciences,
GLUZMAN, P. L. and GUREVICH, A. I., Candidates of Technical Sciences

DETERMINATION OF THE PERIODICITY OF MONITORING DURING STATISTICAL
REGULATION OF PARALLELLY MULTI-LOCALE TECHNOLOGICAL OPERATIONS

Moscow NADEZHNOST' I KONTROL' KACHESTVA in Russian No 5 1976 pp
38-45

[Abstract] The authors are concerned in this article with determining the periodicity of monitoring the statistical regulation of technological operations. They demonstrate that the use of statistical regulation of the single-locale operations for parallelly multi-locale operations is irrational. They examine questions of computing the optimal periodicity of monitoring which will ensure not surpassing the limiting level of quality with a given confidence probability. Figures 5; references 4: 4 Russian.

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USSR

UDC 681.3-192:001.18

SYCHIKOV, N. V.

QUANTITATIVE ANALYSIS OF THE PROPERTIES OF DISCERNIBILITY OF CRITERIA IN A PROBLEM OF PREDICTING THE INDIVIDUAL RESOURCE OF FINISHED PRODUCTS

Moscow NADEZHNOST' I KONTROL' KACHESTVA in Russian No 4, 1976 pp
49-52

[Abstract] The author is concerned in this article with a quantitative analysis of the properties of discernibility of criteria in a problem of predicting the individual resource of products. He examines the use of a linear classification algorithm in a problem of nondisruptive prediction of the individual resource of semiconductor lasers. He compares the results obtained during the realization of various classification algorithms on material from one training sample. Figure 1; references 2: 2 Russian.

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USSR

UDC 519:620.1.05:62-192:658.62

ZAKHAROV, A. P., Candidate of Technical Sciences, ZINOV'YEV, V. S., KOLEDOVA, L. I. and TUMANOVA, A. N.

ON A NEW APPROACH TO PLANNING TESTS FOR VERIFYING THE EXPECTED LEVELS OF RELIABILITY

Moscow NADEZHNOST' I KONTROL' KACHESTVA in Russian No 4, 1976 pp 3-8

[Abstract] The authors are concerned in this article with a new approach to planning tests for verifying the expected reliability levels. They discuss a procedure for planning tests according to probability characteristics based on the Bayes approach using a priori data on the reliability of a test object produced as a result of prediction, previous tests or the exploitation of analog samples. The authors state that one must take into account that using the Bayes approach to planning tests is an effective procedure only when reliable information exists about the expected level of probability of trouble-free operation. Figure 1; references 6: 5 Russian, 1 Western.

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USSR

UDC 62-501:519.2:681.3.004.14

GLICHEV, A. V., Doctor of Economic Sciences, LYAKIN, V. N. and OSE-TROV, A. G., Candidates of Technical Sciences

METHOD OF DETERMINING THE DISPERSION IN ANALYSIS OF THE OVERALL INDICATOR OF QUALITY OF A COMPLEX SYSTEM

Moscow NADEZHNOST' I KONTROL' KACHESTVA in Russian No 4, 1976 pp 53-57

[Abstract] The authors of this article are concerned with a method of determining the dispersion in analyzing an overall indicator of quality of a complex system. They have developed such a method for a complex technical system using a statistical model of the system. In developing this method they took into consideration both the accuracy of the original data produced from the test results of the system and the accuracy of the method of statistical tests. Table 1; references 2: 2 Russian.

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USSR

UDC 621.979:621.73.06

CHERNOMORETS, Ya. Ya., Director, Ryansk Works of Heavy Forging Presses

PRODUCTION OF AUTOMATED HEAVY FORGING PRESSES AT THE RYANSK WORKS

Moscow MEKHAIZATSIYA I AVTOMATIZATSIYA PROIZVODSTVA in Russian No. 1, Jan 76
pp 17-19

[Abstract] The automated forging presses produced at the Ryansk Works contribute to the fullest extent to the major trends in modern metal processing, which are: reduction of labor and material waste, combined with higher product quality. The nationwide production of such equipment has grown steadily, from only 15% of the total metal processing equipment in 1965 to already 17% in 1974. At the Ryansk Works are now produced serially various models of multiposition cold- and hot-upsetting presses as well as sheet-metal stamping presses. The production has been modernized in terms of materials, components, and technology. The design and development of every special-purpose machine requires about one and a half years, and it is not part of the plant operation; it involves also the development of new production techniques, high-precision inspection procedures, and test apparatus - most of which are not used elsewhere and represent an advancement of the state of the art. The capacity for proper testing and evaluation of new models is not yet available here, but plant expansion and reorganization are expected to take care of that. All planning is done in accordance with socialist principles and guidelines set forward at the 25th Communist Party Congress. Figures 3; Tables 4.

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USSR

UDC 389.6:62-192

GONCHAROV, V. F., STAMBULYAN, G. A., Candidates of Technical Sciences

ON THE STANDARDIZATION OF RELIABILITY CRITERIA OF MICROELECTRIC MOTORS AND METHODS OF ANALYZING THEM

Moscow NADEZHNOST' I KONTROL' KACHESTVA in Russian No 3 1976 pp
29-33

[Abstract] The authors are concerned with standardizing reliability criteria for microelectric motors and examine the question of selecting reliability criteria for them. They recommend a method of standardizing the experimental analysis of the criterion for low-series products by grouping the products of various types that are similar in construction, production and operational criteria. Figure 1; table 1; references 5: 5 Russian.

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USSR

UDC 519.2:658.562.012

SERGEYEV, G. A., Doctor of Technical Sciences and POPOV, YU. S.

INVESTIGATION OF NONSTATIONARY STRUCTURES GENERATED IN THE PROCESS OF MANUFACTURING AND CONTROLLING THE QUALITY OF FINISHED PRODUCTS

Moscow NADEZHNOST' I KONTROL' KACHESTVA in Russian No 3 1976 pp 34-41

[Abstract] The authors of this article are concerned here with an investigation of nonstationary structures generated in the process of quality control and manufacture of products. They suggest a procedure for processing statistical data which include elements of nonstationarity thus permitting the accuracy of the analysis of the mean statistical value in sampling to be increased by 20-30%. Figure 1; tables 3; references 3: 3 Russian.

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USSR

UDC 62-192:65.011.56.012.65

BASHARIN, G. P., BROMBERG, M. A. and CHERPAKOV, B. I.

ANALYSIS OF THE PRODUCTIVITY AND RHYTHM OF BLOCKED AUTOMATIC LINES BY ALLOWING FOR THE CHARACTERISTICS OF RELIABILITY AND TECHNICAL SERVICING

Moscow NADEZHNOST' I KONTROL' KACHESTVA in Russian No 2, 1976 pp 27-34

[Abstract] In their analysis of the productivity and rhythm of blocked automatic lines the authors examine a mathematical model of these lines by taking into account unplanned repairs as well as the technical servicing. On the basis of the analysis of formulas for the mathematical expectation and dispersion of productivity they propose an indicator for the operating cycle of the automatic line which is used for selecting the amount of input margin. Figure 1; references 10: 9 Russian, 1 Western.

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USSR

UDC 621.311.1.019.3;621.643.006.8

RUDENKO, YU. N., Irkutsk

METHOD QUESTIONS OF INVESTIGATING THE RELIABILITY OF LARGE POWER
ENGINEERING SYSTEMS

Moscow IZVESTIYA AN SSSR, ENERGETIKA I TRANSPORT in Russian No 1,
Jan-Feb 76 pp 7-17 manuscript received 20 Apr 75

[Abstract] The author demonstrates that the reliability of supplying users of specialized power engineering systems must be studied in its interbranch configuration by taking into account the interchangeability of the various energy resources and the possibility therefore of a mutual emergency arrangement. This must be taken into account in order to develop the proper areas of research and methods and tools to ensure reliability of fuel and energy supply to users. References 19: 19 Russian.

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USSR

NELEPIN, R. A., Symposium Chairman

"MAN-MACHINE" PROBLEM IN SEAGOING VESSELS

Moscow SUDOSTROYENIYE in Russian No. 5, May 76 pp 39-40

[Abstract] An all-union symposium was held in Leningrad in late 1975, dedicated to the problems related to servicing of highly automated seagoing vessels. The following problems were discussed at the symposium: determination of efficient distribution of control functions between operators and automatic systems; establishment of the optimal criteria for the level of automation of shipboard equipment for the present stage of development of technology; selection of requirements for shipboard hardware, particularly control systems and panels, satisfying the psychophysiological characteristics of operators working under the specific conditions on board ship; and evaluation of the efficiency and reliability of shipboard man-machine complexes, including development of recommendations as to durability and operating life of technical equipments, professional selection and training of crew.

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USSR

UDC 629.12.011.524

APOLLONOVA, I. I., BARANNIK, V. P., SUPRUN, L. A.

CHARACTERISTICS OF THERMOPLASTIC COATINGS OF SHIP DRINKING WATER TANKS

Moscow SUDOSTROYENIYE in Russian No. 1, Jan 76 pp 54-56

[Abstract] The cement coatings primarily used to protect ship drinking water tanks from damage have a negative influence on water quality. A new coating, type 4P thermoplastic, is suggested. It is nontoxic and explosion-safe both as applied and during use. The new coating is vibration resistant in use aboard ships for up to 2.5 years and has great protective properties. Delamination, corrosion and ruptures of coatings were not observed. Type 4P plastic has high adhesion to steel and great protective capabilities in both fresh and sea water. It is nontoxic and safe for human health. The composition of the plastic is not given in the article.

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USSR

UDC 629.12:539.4

BABTSEV, V. A., IVANOV, N. A. and SHEMENDYUK, G. P.

INVESTIGATION OF METHODS OF REINFORCING THE BOTTOM HULL PLATES OF SHIPS SUBJECTED TO LOCALIZED LOADS

TRUDY DAL'NEVOSTOCHNOGO POLITEKHNICHESKOGO INSTITUTA [Works of the Far East Polytechnical Institute] in Russian Vol 103, 1975 pp 24-31

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 2, 1976 Abstract No 2V780 by A. G. Gorshkov]

[Text] The paper presents the results of experimental studies on determining the critical loads of the sheets (plates) of a ship's hull with slots under the action of local stresses. Tests were done for bottom plates in which the critical stresses are independent of relative thickness S/L (S is wall thickness, L is the distance between vertical ribs). Loading was done by a special jack. The load drop at loss of stability was manometrically determined. An examination is made of different versions of reinforcement of the walls of ship's hulls. Approximate formulas based on experimental data are presented for determining critical stresses. Experimental results are compared with theoretical calculations.

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USSR

KOROL', YU. M.

ON THE USE OF THE METHOD OF ORTHOGONALIZATION IN PROBLEMS OF HYDRODYNAMICS OF THE NONLINEAR LONGITUDINAL TOSSING OF SHIPS

Nikolayev TR NIKOLAYEV KORABLESTROIT IN-TA [Works of Nikolayev Ship Building Institute] in Russian, No 102, 1975 pp 17-22

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1170]

[Text] The author examines the use of the method of orthogonalization for solving the nonlinear boundary problem for the velocity potential during an investigation of the hydrodynamics of nonlinear longitudinal tossing of ships. The original problem is reduced to a system of nonlinear algebraic equations. The criterion of convergence of the process is the hydrodynamic coefficients of the equations of tossing. References 6. Author's abstract.

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USSR

SLIZHEVSKIY, N. B. and PROSKUCHENKO, YU. M.

HYDRODYNAMIC COMPUTATION OF THE LATERAL AND NORMAL FORCES OF THE RUDDER IN A SCREW STREAM DURING THE WAKE OF THE SHIP

Nikolayev TR NIKOLAYEV KORABLESTROIT IN-TA [Works of Nikolayev Ship Building Institute] in Russian, No 102, 1975 pp 69-83

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1175]

[Text] On the basis of the circulation-separation theory of K. K. Fedyavskiy the authors develop a method of hydrodynamic computation of the component rudders. They obtain formulae for C_y and C_n that are convenient for practical use. For the entire real range of variation in the geometric characteristics of the rudders they construct graphs which permit determining all necessary coefficients appearing in the computational formulas. References 11. Authors' abstract.

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USSR

UDC 331.827:629.12

KUZ'MENKO, V. K., KOSTAKOV, A. A.

THE LABOR PROTECTION OFFICE AT A SHIPBUILDING ENTERPRISE

Moscow SUDOSTROYENIYE in Russian No. 5, May 76 pp 48-50

[Abstract] One of the most important organizational means of preventing accidents on the job and occupational diseases is the organization and operation of an office for protection of labor at an enterprise. The primary tasks of this office include: conduct of introductory training of new employees and of students gaining production experience; instruction of workers in the safety rules, production sanitation and fire safety; increasing the qualifications of administrative workers in the area of protection of labor; organization of production conferences, etc. on safety; popularization of the laws concerning protection of labor; organization of displays on protection of labor; and sharing of experience in the creation of healthy, safe working conditions. Some examples of this work are presented.

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USSR

UDC 629.12.011:539.4.012.1

BELEN'KIY, L. M.

DETERMINATION OF THE MAXIMUM VALUES OF LOCAL LOADS ACTING ON THE HULL OF A SHIP

Moscow SUDOSTROYENIYE in Russian No. 4, Apr 76 pp 10-12

[Abstract] An analytical method is used to determine the maximum values of local loads acting on the hull of a ship during such extreme conditions as towing, crossing ice, grounding, collision with floating objects, loading of heavy cargoes, entrance of the bow into a wave, etc. The model developed is successfully used to estimate the accumulation of residual strain in the plates of cargo decks under the influence of heavy wheel equipment by the end of the service life of a ship.

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USSR

UDC 629.123.3.001

BUDNITSKIY, YU. A.

PRIMARY TRENDS IN THE VARIATIONS IN CERTAIN PARAMETERS OF PASSENGER SHIPS

Moscow SUDOSTROYENIYE in Russian No. 5, May 76 pp 5-7

[Abstract] The main factors involved in the evolution of the primary elements of passenger ship design are the achievements in the area of planning and construction of hull structures, the use of new materials, improvement of equipment, mechanisms, insulation, etc. In addition to the general decrease in weight, there has been a relative increase in above-water volume, leading to an increase in the distance between the center of effort and the center of gravity, requiring an increase in metacentric radius to assure the proper metacentric height. The changes are in general monotonic, indicating the evolutionary nature of development in this area. A figure shows the evolution of the silhouettes of passenger ships, including a predicted ship of the 1980's.

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USSR

UDC 629.12.06:628.84.001.5

TSVETKOV, YU. N., ZHALNIN, M. K.

STUDY OF THE OPERATION OF SHIPBOARD ONE-CHANNEL AIR CONDITIONING
SYSTEMS IN INTERMEDIATE OPERATING MODES

Moscow SUDOSTROYENIYE in Russian No. 4, Apr 76 pp 27-30

[Abstract] Equations are presented for the analysis of the operation of a central single-channel shipboard air conditioning system with brine cooling in intermediate summer modes, as well as results of analysis as applicable to the tanker Velikiy Oktyabr'. The compartments served by the system differ little from each other in heat load, allowing analysis to be based on mean values of temperature and relative humidity. The analysis shows that the method of regulation of the change in brine flow rate currently in use cannot provide comfortable conditions in the compartments when the load is more than 15-20% below the maximum.

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USSR

UDC 006:629.12.001.51/.55.002

KIRSANOV, B. A.

STANDARDIZATION OF THE PRINCIPLES OF THE MODULAR SYSTEM OF BUILDING
AND EQUIPPING OF SHIP COMPARTMENTS.

Moscow SUDOSTROYENIYE in Russian No. 5, May 76 pp 10-15

[Abstract] A study is made of the basic principles of dimensional coordination. The problem of creating a modular system of construction and equipping of ship compartments is stated. The following steps are recommended for solution of the problems mentioned in the article: 1) development and introduction of a general standard for dimensional coordination of ship compartments; 2) development of high quality fire retarding structures and decorative-finishing materials meeting the requirements of shipbuilding; and 3) complex solution of the problem of creation and introduction of a modular system of construction and equipping of ship compartments based on standardization.

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USSR

UDC 539.4

LEBEDEV, A.A., NOVIKOV, N.V., KOVAL'CHUK, B.I., and LAMASHEVSKIY, V.N.

EFFECT OF THE STRESSED STATE'S FORM ON THE STRENGTH OF CHROME-NICKEL STEELS AND ALUMINUM AND TITANIUM ALLOYS AT LOW TEMPERATURES

KOSMICHESKIYE ISSLEDOVANIYA NA UKRAINE. RESPUBLIKANSKIY MEZHVEDOM-STVENNIY SBORNIK [Space Research in the Ukraine; Republic Interdisciplinary Collection of Works] in Russian No 6 1975 pp 29-35

[From REFERATIVNIY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V1307 (resume)]

[Text] The authors present the results of an experimental investigation of chrome-nickel steels and aluminum and titanium alloys in a plane stressed state under conditions of normal and low temperatures. The experiments were performed with thin-walled tubular test pieces by loading them with an axial force and inner pressure. Based on a comparison of the experimental data with the results of calculations made according to various limiting state theories, the authors establish strength and plasticity criteria for the investigated materials in the temperature range from +20 to -180°.

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USSR

UDC 539.4

VORONOV, I.N., VEDUTIN, V.F., and BEREZIN, V.K.

DESTRUCTION OF A BRITTLE ISOTROPIC MATERIAL BY DETONATION OF A CYLINDRICAL EXPLOSIVE CHARGE IN THE PRESENCE OF EXTERNAL COMPRESSING STRESSES

SBORNIK NAUCHNYKH TRUDOV KUZBASSKOGO POLITEKHNICHESKOGO INSTITUTA [Collection of Scientific Works From the Kuzbass Polytechnic Institute] in Russian No 77 1975 pp 29-36

[From REFERATIVNIY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V1335 by N.N. Kholin]

[Text] The authors analyze the material destruction process on the basis of the theory of strength, according to which destruction begins when the acting normal tensile stresses equal the material's tensile strength limit. The tensile stresses are created by external forces and the blast wave. The authors allow for an additional concentration of stresses by introducing a correcting factor into the expressions for the value of the tangential stresses. They estimate

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USSR

VORONOV, I.N., VEDUTIN, V.F., et al., SBORNIK NAUCHNYKH TRUDOV KUZ-BASSKOGO POLITEKHNICHESKOGO INSTITUTA No 77 1975 pp 29-36

the possible length of the crack in plexiglass for a constant explosive impulse and different levels of external compressive stresses. They also discuss the problem of the stressed state of an infinite plate with a cylindrical hole that is subjected to biaxial compression.

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USSR

UDC 539.4:536.543

ZASIMCHUK, YE.E., KRIVENYUK, V.V., and MARUSIY, O.I.

EFFECT OF THE ANNEALING TEMPERATURE ON THE CREEP RESISTANCE OF COMMERCIAL MOLYBDENUM AT 1,400°C

KOSMICHESKIYE ISSLEDOVANIYA NA UKRAINE. RESPUBLIKANSKIY MEZHVEDOMSTVENNIY SBORNIK [Space Research in the Ukraine; Republic Interdisciplinary Collection of Works] in Russian No 6 1975 pp 64-70

[From REFERATIVNIY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V1392 (resume)]

[Text] The authors study the effect of the structure created during the process of annealing in the temperature interval 1,200-2,000° on molybdenum creep at 1,400°. They show that in this annealing temperature interval, molybdenum deformed by rolling recrystallizes (1,200-1,400°); at higher annealing temperatures (with the annealing process lasting 1 hour) anomalous enlargement of the grains is seen (secondary recrystallization), which process is completely finished after 1 hour at 2,000°. They study the structural changes in all of the used batches of molybdenum when creep is occurring, and show that a sharp

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ZASIMCHUK, YE.E., KRIVENYUK, V.V., et al., KOSMICHESKIYE ISSLEDOVANIYA NA UKRAINE. RESPUBLIKANSKIY MEZHVEDOMSTVENNIY SBORNIK No 6 1975 pp 64-70

acceleration in creep deformation is observed after annealing, in connection with which a large part of the test piece's volume turns out to be occupied by anomalously large grains ($1,800^\circ$). The partial occurrence of secondary recrystallization during annealing does not have a substantial effect on the creep rate and the time to failure of the molybdenum at $1,400^\circ$. References 13.

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USSR

UDC 620.17

VAKHRUSHEVA, V.F., and SUKHIN, L.T.

THE ABSOLUTE THERMOELECTROMOTIVE FORCE OF TITANIUM AND THE CHANGE IN IT DURING ELASTIC DEFORMATION

Chelyabinsk SBORNIK NAUCHNYKH TRUDOV CHELYABINSKOGO POLITEKHNICHESKOGO INSTITUTA [Collection of Scientific Works From the Chelyabinsk Polytechnic Institute] in Russian No 160 1975 pp 107-113

[From REFERATIVNIY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V1499 by S.V. Zhuravlev]

[Text] The authors present the results of an experimental investigation of the dependence of titanium's absolute thermoelectromotive force in the temperature interval from -196 to $+230^\circ$, as well as the change that takes place in it when acted upon by elastic deformation corresponding to stresses of 10, 20, and 30 kg/mm^2 . Based on an analysis of the experimental results and available data in the literature, they find four temperature areas where there is a change in the induced and diffusion thermoelectromotive forces. Titanium's induced thermoelectromotive force is an order higher than the analogous

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USSR

VAKHRUSHEVA, V.F., and SUKHIN, L.T., SBORNIK NAUCHNYKH TRUDOV CHELYA-BINSKOGO POLITEKHNICHESKOGO INSTITUTA No 160 1975 pp 107-113

values for the noble metals. Therefore, there are grounds for using it for purposes of measuring the residual stresses in parts made of titanium-based alloys. References 10.

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USSR

UDC 629.78.002.3

GOODMAN, J., GLIXMAN, J.

STRUCTURAL EVALUATION OF LONG RODS OF A BORON-EPOXY COMPOSITE

KOMPOZITS MATERIALY V KONSTRUKTSII LETATEL'N APPARATOV in Russian
Moscow Mashinostroyeniye Press 1975, pp 133-141

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.191 by T. A. YE.]

[Text] Beam structures are frequently used as a bond between a spacecraft and booster. These beams should be planned so that they can withstand the quasistatic loads arising in the process of flight. In addition to strength, the beams should have the necessary rigidity. Under the influence of external factors, elements of the beam are loaded in extension and compression. For long, nonrigid elements of the beam, the accepted structural version of attachment is the "fork-lug" joint at both ends. The optimal structural outline of the cross section for a long element under the influence of compressive loads is a thinwall circular pipe. In planning beam structures for spacecraft,

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USSR

GOODMAN, J., GLIXMAN, J., KOMPOZITS MATERIALY V KONSTRUKTSII LETATEL'N APPARATOV Moscow Mashinostroyeniye Press 1975, pp 133-141

the possibility has been revealed of achieving minimum mass. The length of an individual beam element between axial lines of attachment bolts is 2.4 m in this case. This element was planned for the use of the usual material for such structures -- an aluminum alloy in the form of a pipe of thinwall circular cross section. The planned tubular element of the required rigidity and strength had a mass of 1.63 kg. The potential possibility of reducing the mass of the rod by using other materials was studied. Beryllium was found to be best, due to its very high ratio of rigidity to density, but the technology of production of thinwall pipe of beryllium has not yet been developed. Under these conditions, the most suitable material was found to be a boron composite with a mass of the element of about 0.860 kg. For final evaluation, it is necessary more precisely to determine the mass with

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USSR

GOODMAN, J., GLIXMAN, J., KOMPOZITS MATERIALY V KONSTRUKTSII LETATEL'N APPARATOV Moscow Mashinostroyeniye Press 1975, pp 133-141

assigned rigidity and strength. A program of testing was undertaken to produce this information. In order to perform calculations to determine the load-bearing capacity of the boron-epoxy rod, the following experimental data were needed: axial rigidity, load, local loss of stability and permissible bending moment. The results of the studies showed that the boron-epoxy tubular strength elements can be used in spacecraft for significant savings of beam structure mass. 2 figures; 7 references.

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USSR

UDC 629.78.002.3

DAVIS, J., RAMMLER, D.

THE USE OF COMPOSITE MATERIALS IN THE BEAM STRUCTURES OF SPACECRAFT

KOMPOZITS MATERIALY V KONSTRUKTSII LETATEL'N APPARATOV in Russian
Moscow Mashinostroyeniye Press 1975, pp 169-177

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No.
4.41.192 by T. A. YE.]

[Text] Beryllium and a unidirectional boron-epoxy composite can be used in the manufacture of lightly loaded beam structures used in unmanned spacecraft. The stresses in these structures are primarily directed in one direction and are comparatively low in magnitude, since these structures are created to provide the required rigidity and vibration resistance. Considering this, studies were performed on the possibility of using the beryllium alloy Be+38% Al and a boron-epoxy composite to manufacture lightly loaded beams. One of the main tasks of this experiment was to show that the savings in mass due to the use of composites can be actually achieved. The work was developed

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USSR

DAVIS, J., RAMMLER, D., KOMPOZITS MATERIALY V KONSTRUKTSII LETATEL'N
APPARATOV Moscow Mashinostroyeniye Press 1975, pp 169-177

in several stages, calling for close contact with industry for the production of pipes of beryllium and the Be-38% Al alloy, and the authors' own investigations on the development of a technology for the manufacture of pipes of a unidirectional boron-epoxy composite. Another portion of the work consisted of the study of the design of the beams; analytic calculation and development of a computer program in order to determine the effectiveness of structures, as well as development of ideas and methods for making of joints for various types of tubular materials and, finally, testing and analysis of results. The results of calculations, structures, dynamic and static testing of five beams manufactured of aluminum, beryllium, the alloy Be-38% Al, S-glass epoxy and boron-epoxy composites are discussed. The following conclusions are drawn: 1) the thinwall pipes of boron-plastic,

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USSR

DAVIS, J., RAMMLER, D., KOMPOZITS MATERIALY V KONSTRUKTSII LETATEL'N APPARATOV Moscow Mashinostroyeniye Press 1975, pp 169-177

beryllium and Be+38% Al developed are suitable for use in thinwall beam structures; 2) the difficulties arising in the creation of beam structures, consisting in the attachment of types of rigid materials to quasibrittle structures, have been overcome by the use of tubular cluster-shaped welded aluminum transition pieces and sectional glued bushings; 3) the use of improved materials in beam structures can yield up to 50% savings of mass in comparison with aluminum; 4) all beams withstood vibration testing comparable to the loads experienced in flight. 2 figures.

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USSR

UDC 629.78.002.3

DULLES, R.

METHODS OF JOINING IMPROVED COMPOSITE MATERIAL

KOMPOZITS MATERIALY V KONSTRUKTSII LETATEL'N APPARATOV in Russian Moscow Mashinostroyeniye Press 1975, pp 79-87

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.198 by T. A. YE.]

[Text] The purpose of the present investigation is the development of data which could be used by a designer to determine the critical parameters of the joints between composite materials and metals. To do this, the shear strength of overlap glue joints was measured, as well as the crushing strength of the composite. Boron-epoxy layered sheets with titanium alloy Ti = 6Al = 4V were glued together -- a combination selected due to the good compatibility of the coefficients of thermal expansion and high specific strength and modulus of titanium. Three versions of orientation of the fibers, two types of adhesive and two joint types (glued and glued-riveted) were studied. Examples are presented of the use of data produced as a result of the investigation of joints between metals and composite materials, for determination of the critical parameters of specific structures. 2 references.

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USSR

UDC 539.37;539:214

GOKHBERG, YA.A., GRISHIN, A.P., GUTMAN, M.YU., DOROFYEV, A.M., and CHERNOUSOV, A.M.

THE EFFECT OF AN IRREGULAR ROLLING PROCESS ON THE SETTING OF THE LAYERS OF A COMPOSITION MATERIAL WITH CIRCULAR PLATING

Volgograd TRUDY VOLGOGRADSKOGO POLITEKHNICHESKOGO INSTITUTA [Works of the Volgograd Polytechnic Institute] in Russian No 7 1975 pp 23-27

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 4V496 (resume)]

[Text] The authors present the results of their investigation of the effect of an irregular rolling process on the setting strength of the heterogeneous layers of a compound consisting of 45+Kh18N10T steel. Based on these results, they make recommendations on cutting off the ends of a billet that is being rolled. References 6.

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USSR

UDC 539.37;539:214

AVIDON, D.A., GOKHBERG, YA.A., MARCHENKO, V.Z., and TSARYUK, V.I.

ON THE EFFECT OF VOLUMETRIC PLASTIC DEFORMATION ON THE PLASTICITY OF A BIMETAL

Volgograd TRUDY VOLGOGRADSKOGO POLITEKHNICHESKOGO INSTITUTA [Works of the Volgograd Polytechnic Institute] in Russian No 7 1975 pp 27-32

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V523 (resume)]

[Text] The authors analyze the effect of preliminary cold plastic deformation caused by drawing on the change in the strength and plasticity characteristics of wire made of 80 steel or Kh18N10T steel and bimetallic wire composed of a combination of these steels. They present data on the change in the plasticity criterion under compression during drawing of the investigated materials and advance a hypothesis about the change in the failure mechanism during twisting of the composition material (which has undergone preliminary volumetric deformation) because of the embrittlement of the Kh18N10T steel layer. References 9.

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USSR

UDC 621.923.1.001.5

SILIN, S. S., LEONOV, B. N., LOBANOV, A. V.

STUDY OF HIGHLY PRODUCTIVE FLAT GRINDING OF THE ALLOY E1437BVD

Moscow VESTNIK MASHINOSTROYENIYA in Russian No. 2, Feb 76 pp 77-78

[Abstract] In order to determine the effectiveness of the combined use of high speed high pressure grinding and hard fillers, studies were performed intended to determine the optimal modes and the surface quality produced by flat grinding of parts of the heat-resistant nickel alloy E1437BVD. The data from the investigation show that proper selection of the abrasive tool for high speed grinding can increase the productivity by 1.7 times, while the use of tools with fillers allows the specific productivity to be increased.

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USSR

UDC 629.113.001.2".401.7"

RUSOV, K. D., STEKOL'NIKOV, V. V., Yaroslavl Motor Plant

THE STRENGTH RESERVE AND DURABILITY

Moscow AVTOMOBIL'NAYA PROMYSHLENNOST' in Russian No. 2, Feb 76
pp 31-32

[Abstract] A study is made of the influence of the method of cooling and the quenching media used on the strength of hardened parts. The primary properties of ZSP-1 polymer quenching medium, created at the Yaroslavl Motor Plant, and its influence on warping during hardening of crankshafts and cylinder sleeves are studied.

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USSR

ISUPOVA, V. I. and SEMENOV, YU. A.

INVESTIGATION OF THE BENDING OF UNREINFORCED BEAMS OF PHENOL POROUS PLASTIC FL-3

Leningrad SB TR LENINGR INZH-STROIT IN-TA [Collection of Works of Leningrad Engineering Design Institute] in Russian, No 108, 1975 pp 69-75

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V1184 by I. M. Kershteyn]

[Text] The authors give the results of an experimental investigation of the strength and deformation properties of beams of porous plastic under conditions of pure bending. Short-term tests were conducted with gradual loading to fracture. The duration of the tests for creep equaled 1500 hours. On the basis of the obtained experimental data they demonstrated the possibility of practical computations to make the weight of the material over the cross section of the beam symmetrically distributed. They demonstrated the applicability of the nonlinear heritage of the theory of creep to the investigated plastic.

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USSR

IOSELIANI, V. P., CHEGOLYAYEV, F. D., SMYKOV, V. I. and IVANOV, O. N.

INVESTIGATION OF CREEP OF GLASS TEXTOLITE

Moscow TR MOSK IN-TA KHIM MASHINOSTR [Works of Moscow Institute of Chemical Machine Building] in Russian, No 60, 1975 pp 91-94

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V1201 by N. I. Malinin]

[Text] For investigation of creep of glass plastic pipes wound from TS 8/3-250 glass fabric and impregnated with epoxide resin, from the pipes along the generatrix the authors cut samples with a rectilinear axis and also rings. The creep tests on samples with the rectilinear axis were made on AIMA-5-1 machines and on the ring samples -- on the ZST-3/3 machine equipped with a special attachment. These machines were equipped with electroheating devices for making tests at elevated temperatures. The authors present the results of the tests for temperatures up to 100°. The visco-elastic properties of the investigated glass plastic were described on the basis of linear theory of heritage of Boltzman-Volterra; the fractional-exponential nucleus of creep was used.

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GLEBOV, V. P., ANTIKAYN, P. A., ZUSMAN, V. M., TARATUTA, V. A., MAMET, A. P., KURILENKO, Ye. P., Central Committee for Heavy Industry

STUDY OF THE INFLUENCE OF THE pH OF A MEDIUM AT SUPERCRITICAL PRESSURE AND THE CONCENTRATION OF HYDROGEN IN THE MEDIUM ON THE INTENSITY OF OXIDATION OF STEELS OF VARIOUS CLASSES

Moscow TEPLOENERGETIKA in Russian, No 3, Mar 76, pp. 77-81

[Abstract] Comparative experimental data are produced on the oxidizability of steels of various types with various values of pH (from 7 to 10.5), hydrogen concentration (from 80 to 800 $\mu\text{g/kg}$) and pressure (16 and 28 MPa). Steel types studied included 12Kh1MF, EI756 and Kh18N12T, as well as NSM-2 (12Kh2M1), a Japanese steel, pipes of which are used to manufacture gas tight screens in 300 and 800 megawatt power units. The intensity of processes of corrosion of steels is almost halved as pH is increased from 7-8 to 9.5-10.5. Hydrogen concentration has almost no influence on corrosion rate of steels. Kh18N12T steel corrodes 5-10 times more rapidly than 12Kh1MF steel; 12Kh2M1 and EI756 occupy intermediate positions. At supercritical pressure, corrosion rate almost doubles for all the steels studied.

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KALENDAREV, R. I., OL'SHVANGER, B. A., FRIDKIN, V. M., CHIKVAIDZE, G. V. and EYDUS, Ya. A., Latvian State University imeni P. Stuchka

A SILVERLESS PHOTOGRAPHIC PROCESS BASED ON PHOTOSTIMULATED PHASE CONVERSIONS IN ARSENIC

Moscow ZHURNAL NAUCHNOY I PRIKLADNOY FOTOGRAFII I KINEMATOGRAFII in Russian, Vol 21, No 3, 1976, pp. 165-169 manuscript received 5 November 1975

[Abstract] The authors experimentally studied the photostimulated phase conversions in arsenic. Thin films of As_α produced by vacuum evaporation on a substrate cooled to about 150 K were studied. Atomization and investigation of the specimens were performed in a vacuum optical cryostat at a pressure of about 10^{-6} torr. Exposure of the layer to light causes it to darken and changes the spectral distribution of absorption. A photograph produced using the method is presented as an example.

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BOGDAN, L. S. and SANDUL, G. A.

FULFILLMENT OF THE RULE OF INTERACTION IN SOLID SOLUTIONS OF ANTHRACENE
IN POLYETHYLENE

Moscow ZHURNAL NAUCHNOY I PRIKLADNOY FOTOGRAFII I KINEMATOGRAFII in Russian,
Vol 21, No 3, 1976, pp. 215-217 manuscript received 2 December 75

[Abstract] Kinetic measurements are performed of the damping of luminescence of a photosensitive layer with varying intensity of illumination. Pure anthracene was introduced to a polyethylene matrix purified of various organic impurities by hexane extraction for at least 50 hours from a saturated solution of anthracene in hexane. The course of the curves shows that the sensitivity of the layer is not dependent on holding time with variations of exposure time. During exposure, the concentration of anthracene molecules decreases, that of nonluminescent products -- increases.

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LAPIN, A.M., KUZ'MINOV, S.S., and KOVCHUR, S.G.

THE EFFECT OF HYDRODYNAMIC FACTORS ON THE CHEMICAL POLISHING RATE FOR
GLASS IN LAMINAR AND TURBULENT FLOWS

STEKLO. TRUDY NII STEKLA [Glass: Works of the Scientific Research
Institute of Glass] in Russian No 2(149) 1975 pp 51-57

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5B487
(resume)]

[Text] The authors discuss the effect of hydrodynamic factors on the chemical polishing rate for glass situated in laminar and turbulent flows of polishing solution. They investigate the chemical processes in the boundary layer that appears on the surface of the glass being polished and in the ducts when the liquid is flowing in laminar and turbulent modes. They also determine the influence of "nonchemical" factors on the chemical polishing rate. The authors present mathematical relationships that make it possible to calculate and carry out the chemical polishing of glass under optimum conditions and with due consideration for "nonchemical" factors. References 8.

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YEREMIN, L. P. and IL'IN, A. P., Tomsk Polytechnical Institute imeni S. M. Kirov

PRODUCTION OF SILVERLESS PHOTOGRAPHIC IMAGES BASED ON MONOVALENT COPPER THIOCYANATE

Moscow ZHURNAL NAUCHNOY I PRIKLADNOY FOTOGRAFII I KINEMATOGRAFII in Russian, Vol 21, No 3, 1976, pp. 221-223 manuscript received 29 December 75

[Abstract] The authors have solved the problem of developing and fixing photosensitive layers based on monovalent copper thiocyanate, using the stannite ion as the developing agent. The sensitivity of the photographic emulsion achieved was $1.5 \cdot 10^{-4}$ J/cm², which can be improved. Sensitivity could be increased by introducing various ions and small quantities of complex silver and paladium compounds.

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KAMYSHANCHENKO, N.V., BOBENETS, I.I., and POSKACHEY, A.N.

THE EFFECT OF CYCLIC DEFORMATION ON THE PLASTIC PROPERTIES OF TECHNICALLY PURE NICKEL

Belgorod SBORNIK TRUDOV BELGORODSKOGO TEKHNOLIGICHESKOGO INSTITUTA STROITEL'NYKH MATERIALOV [Collection of Works From the Belgorod Engineering Institute of Construction Materials] in Russian No 10 1975 pp 53-58

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V525 (resume)]

[Text] The authors investigate the effect of temperature and the amplitude and number of cycles on the change in the strength properties of technically pure nickel. Flat test pieces made of grade NP-1 nickel were subjected to variable-sign loading on a special device. The authors establish that preliminary variable-sign loading contributes to an increase in the flow limit of pure nickel. In a complicated manner, the magnitude of the flow limit's increase depends on the number of cycles, the amplitude of the loading, and the temperature. References 11.

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USSR

UDC 629.78.002.3

SARYMSAKOV, KH. G., FAR'ER, I. L., VOL'F, G. P., LYASHKO, V. K.

THE PROBLEM OF USING FASTENING PARTS OF TITANIUM ALLOYS

[TR] TASHKENT POLITEKHN IN-TA in Russian 1974, No. 137 pp 79-83

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.189 by A. V. U.]

[Text] The economic effect gained by the use of fasteners of titanium alloys instead of alloy steels is calculated. In order to compare the materials by weight, the σ/γ ratio is used, where σ represents the tensile stresses permissible for the material, γ is the specific gravity. For alloy steel, this ratio reaches 23, for titanium alloys -- 33. The specific capital investment justifying the increase in rated load is 382.0544 rubles per kg.

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USSR

UDC 629.78.002.3

TROSHCHENKO, V. T., STRIZHALO, V. A., MOROZOV, B. S., IL'IN, A. A., ZINCHENKO, A. I.

STUDY OF LOW-CYCLE FATIGUE OF TITANIUM-BASED ALLOYS IN PULSATING EXTENSION

KOSMICH ISSLEDOVANIYA NA UKRAINE RESP MEZHVED SB in Russian 1975, No. 6 pp 39-45

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.187 from the resume]

[Text] A study is made of the regularities of deformation and rupture of titanium-based alloys in low-cycle fatigue testing considering the influence of various operational and technologic factors. Titanium alloys are studied with α (VT1-0, VT5-1), pseudo- α (AT2-2, OT4) and $\alpha+\beta$ -structure (VT14, VT6S, VT3-1). It is shown that the nature of rupture of the alloys (quasistatic or fatigue) is determined to a great extent by the influence of temperature, surface cracks and welded seams. 5 figures; 2 tables; 8 references.

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USSR

UDC 629.78.002.3

KUZ'MENKO, V. A., GRISHAKOV, S. V.

STUDY OF THE ENDURANCE OF METALS UNDER HIGH-FREQUENCY LOADING AT LOW TEMPERATURES

KOSMICH ISSLEDOVANIYA NA UKRAINE RESP MEZHVED SB in Russian 1975, No. 6 pp 35-39

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No. 4.41.188 from the resume]

[Text] A method is presented for fatigue testing in a medium of liquid nitrogen ($t = -196$ C) using a magnetostriction resonant installation with the frequency of symmetrical homogeneous extension-compression about 3 KHz. Curves of the endurance of specimens of austenitic stainless steels types Kh18N10T, 000Kh20N16AG6 aluminum alloy D16T, titanium alloy OT-4-1 are presented, constructed from the results of testing on a base of 10^8 cycles, at low (-196 C) and room (20 C) temperatures. It is noted that the high loading frequency has a significant influence on the endurance characteristics, causing them to increase. 6 figures; 4 references.

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USSR

UDC 621.181.8-423.2.001.5

KOZLOVA, R. P., PRITCHINA, O. P., KOBRIN, V. M., BEREZINA, T. G. and MINTS, I. I., Chelyabenergo, Urals Higher Technical School and the Taganrog Boiler Plant

DAMAGE TO THE BENDS IN REFLECTOR STEAM GENERATORS OF Kh18N12T STEEL AND NEED FOR INCREASING THE RELIABILITY OF THEIR OPERATION

Moscow TEPLoENERGETIKA in Russian, No 5, May 76, pp. 51-54

[Abstract] Bent sections of pipe have been damaged in the steam generators of 200 and 300 megawatt power units in the output stages. The damaged areas have been located primarily near the neutral strands of the bend and consisted of longitudinal cracks developing from the internal surface of the pipe. Analysis shows that one of the main reasons for the rupture of pipes of Kh18N12T steel in this case is poor quality heat treatment, after which the influence of cold strain hardening is still retained. Heat treatment is required which leads to recrystallization and full strain relief. This means austenitization at $1120-1150$ C for 30 minutes. Industrial testing of this mode of heat treatment for 40,000 hours at power plants of Chelyabenergo has shown the high reliability in use of heat treated steam generating plant pipe.

MEL'TSER, L. Z., DREMLYUKH, T. S., SILINA, L. B., Odessa Tekhnological Institute for the Refrigeration Industry, SEMENENKO, M. I., All-Union Scientific Research Institute for the Cable Industry

STUDY OF THE STABILITY OF OIL-FREON SYSTEMS

Moscow KHOLODIL'NAYA TEKHNIKA in Russian, No 5, 1976, pp. 20-24.

[Abstract] The chemical stability of cooling oils in contact with cooling agents is determined abroad by one of two generally accepted methods of testing in sealed glass ampules -- the Phillips test or the Elsey test. The authors tested the stability of over 80 oil-freon systems (solutions) using these methods in 1968. The purpose of the present investigation was to continue these tests and produce a functional dependence of the stability of oil-freon solutions on various influencing factors and compare them. The method of experimental planning is used. The use of the method of mathematical models yields a clear idea of the relative influence of each factor on the stability of a specific oil-freon system. The scale developed can be used to compare the stability of oils of various types. A final conclusion concerning the suitability of a new oil for operation under specific conditions can be made after long-term test stand studies.

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USSR

ZAYTSEV, G. P., PASHKOV, V. A., BOLOTNIKOV, B. I., MAKHOV, L. S. and GANYUSHKIN, YU. P.

TOWARD A METHOD OF DETERMINING THE COMPLEX OF FATIGUE CHARACTERISTICS OF A COMPOSITION MATERIAL ON HOLLOW SAMPLES

Moscow VSES NAUCH-TEKHN SIMPOZ. METODY I TEKHN EKSPERIM ISSLED MEKH SVOYSTV PLASTMASS [All-Union Scientific-Technical Symposium. Methods and Techniques of Investigations of the Properties of Plastics, Collection of Works] in Russian, 1976 pp 126-128

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 1521 by P. F. Koshelev]

[Text] According to tests of hollow samples prepared by solid winding from AG-4s plastic glass, domestic carbon plastics and carbon glass plastics for tension-twisting-internal pressure the authors determined five necessary elastic constants characteristic of the two-dimensional stressed state. These constants can not be obtained on flat samples since the working of the material in construction during continuous winding is not identical to the working of the material cut from the same material.

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USSR

BORZYAK, A. N., GONCHARENKO, B. A., KOSHELEV, P. F., MIKHEYEV, V. S. and NOVIKOV, I. I.

MECHANICAL PROPERTIES OF ALLOYS OF THE SYSTEM TITANIUM-MOLYBDENUM-ZIRCONIUM AT 293 AND 77° K

Moscow FIZ-MEKH I TEPILOFIZ SVOYSTVA METALLOV [Physico-Mechanical and Thermophysical Properties of Metals, Collection of Works] in Russian, Izd-vo Nauka, 1976 pp 31-37

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 1313]

[Text] The authors present the results of an investigation of the microstructure and hardness of alloys of the system titanium-molybdenum-zirconium (up to 12% Σ Zr+Mo) in the quenched and annealed state. They showed that the best combination of properties of strength and plasticity is possessed by alloys with a content of 2 to 6% Σ Zr+Mo with component ratio of 3:1. References 5. Authors' abstract.

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USSR

GERKINA, V. S.

EXPERIMENTAL DETERMINATION OF THE DEFORMATIONS IN CEMENTED CONNECTIONS

Kazan' SB ASPIRANTSK RABOT. KAZAN UN-T. TOCHN NAUKI. MATEMATIKA. MEKHANIKA [Collection of Works by Graduate Students. Kazan' University. Precise Sciences. Mathematics. Mechanics] in Russian, 1975 pp 91-95

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 1055 by Yu. A. Belyayev]

[Text] The author investigates the deformed state of cemented connections caused by the tensile stress and bending moment. For explanation of the pattern of the deformation of a real thin layer she tests models with different thicknesses of the cemented seam (from 4 to 20 mm). The outer layers of the samples are made from sheet duraluminum D16AT. Cementing is done with an epoxide cement of cold hardening. The deformations were measured with the aid of 3 mm foil sensing elements. The measurements were done in the elastic zone. Curves of the deformations perpendicular to the plane of cementing were obtained for length, thickness and width of the cemented layer.

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USSR

LOMAKIN, V. V., PLANOVSKIY, A. N. and BUTKOV, V. V.

EXPERIMENTAL INVESTIGATION OF THE BASIC FACTORS INFLUENCING THE
TRANSPORT OF GASES THROUGH POLYMER MEMBRANES

Moscow TR MOSK IN-TA KHIM MASHINOSTR [Works of Moscow Institute of
Chemical Machine Building] in Russian, No 61, 1975 pp 135-138

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B858
by Yu. M. Glushkov]

[Text] Using a number of graphs the authors present the results of an experimental study of the process of gas filtration of He, N₂, and CO₂ through a semipermeable membrane of teflon-4 material, 0.3 mm thick with pressure drops p on the membrane to 150 at and at temperatures from 17 to 87°. The obtained data agree with the common theoretical concepts of gas filtration through porous membranes and with the data of other experimenters. In the case of CO₂ filtration they observed a worsening of the permeability of the membrane as a consequence of the intracapillary condensation of the gas.

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USSR

SOBOLEV, V. S.

ON THE SPECTRUM OF "PHASE" NOISE AT THE OUTPUT OF A LASER DOPPLER GAUGE OF VELOCITY

Novosibirsk KOGERENTNO-OPTICH DOPLEROVSK USTROYSTVA V GIDROAERODINAM EKSPERIMENTE [Coherent-Optical Doppler Devices in a Hydro-aerodynamic Experiment, Collection of Works] in Russian, 1974 pp 107-110

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B 1341 by A. V. Frolov]

[Text] The random character of the particle distribution in space results in the fact that upon the application of signals from several particles the phase, and consequently the frequency of the total signal at the output of the receiver, fluctuates even in a laminar gradient-free stream. A noise stress appears at the analog output of the demodulator in addition to the constant stress proportional to the mean velocity in the frequency demodulation of such a signal accomplished for the extraction of useful information. An analysis is made of the spectrum of this signal. It is demonstrated that the spectrum of the noise is much wider than the spectrum of the original signal. This fact must be taken into

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USSR

SOBOLEV, V. S., KOGERENTNO-OPTICH DOPLEROVSK USTROYSTVA V GIDROAERODINAM EKSPERIMENTE, 1974 pp 107-110 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1341]

account in selecting the pass band of the filter at the output of the frequency demodulator. The band must be limited by the upper frequency of the expected spectrum of turbulent pulsations in velocity. The true spectrum of turbulent pulsations can be obtained by subtracting from the total spectrum of the signal at the output of the demodulator the spectrum of noise obtained at the same velocity in a laminar stream.

2/2

USSR

UDC 771.534.2:535.853

GORSKIY, S. M., KROTOVA, Z. V., KRUGLOVA, N. N., FEDOROVA, V. K.,
Scientific Research Institute for Radiophysics

MEASUREMENT OF THE RELATIVE SPECTRAL SENSITIVITY OF PHOTOGRAPHIC
MATERIALS BY FOURIER SPECTROMETRY

Moscov ZHURNAL NAUCHNOY I PRIKLADNOY FOTOGRAFII I KINEMATOGRAFII
in Russian Vol. 21 No. 2, Mar-Apr 76 pp 116-118 manuscript received
28 Aug 74

[Abstract] A method is suggested for estimating the spectral sensitivity of a photographic material by measurement of the photoactinic flux which characterizes the spectral distribution of photographic action $\phi_v = E_v S_v$, where E_v is the energetic monochromatic illumination created by a light source in the plane of the photographic material being studied. The method of Fourier spectrometry is used, consisting in recording of the self-correlation function (interferograms) of the radiation with known spectral distribution on the photographic material being studied and subsequent Fourier analysis of this function.

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USSR

UDC 629.78.058.42

BESEKERSKIY, V. A., BEREZOV, V. V., NEBYLOV, A. V.

PECULIARITIES OF THE USE OF DIGITAL COMPUTERS IN INERTIAL SYSTEMS FOR
MEASUREMENT OF VERTICAL DISPLACEMENTS AND VELOCITIES

TR LENINGR IN-T AVIATS PRIBOROSTR in Russian 1975, No. 95 pp 14-20

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3 1976 Abstract No.
3.41.251 from the resume]

[Text] Requirements are formulated for the transmission functions of digital computers for the calculation of vertical displacements and velocities of the point of an object using an accelerometer or gyrointegrator as the transducer, the output signal of which contains a component of noise, resulting from inaccurate compensation for the acceleration of the force of gravity. Formulas are produced for methodological and noise errors in measurement. It is shown that, based on the conditions of input of information to the computer, the use of the gyrointegrator has significant advantages over the use of the accelerometer. 1 figure; 3 references.

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USSR

UDC 629.78:621.396

YELISEYEV, A. A., PRUSOVA, L. N., RUDAKOV, YE. V.

OPERATING CHARACTERISTICS OF OPTIMAL DETECTION SYSTEMS USING THE
INSTANTANEOUS FREQUENCY OF REFLECTED RADIO PULSES

TR LENINGR IN-T AVIATS PRIBOROSTR in Russian 1975, No. 95 pp 162-166

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No.
3.41.261 from the resume]

[Text] A study is made of the characteristics of optimal systems for detection of weak signals against a background of normal correlated noise, realizing the instantaneous filling frequency of the signals received. The algorithm presented for detection allows the potential possibility of selection of a moving target with digital and analog rejecting devices to be evaluated. 2 figures; 2 references.

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USSR

UDC 662.612:778.4

SOLUYANOV, Yu. F. and SHURKIN, Ye. N., Mosgasproyekt

HOLOGRAPHIC RECORDING OF PARTICLES IN A TWO-PHASE STREAM FROM AN ACOUSTICAL
NOZZLE

Moscow TEPLOENERGETIKA in Russian, No 3, Mar 76, pp. 49-53

[Abstract] The holographic method of single-ray pulse recording is a rapid and experimentally simple method of determining the picture of dispersion in a two-phase stream, recording particles 20 μm and larger in diameter. The acoustical sprayer used in these experiments can be used in both combined and gas burners operating at high pressure with liquid or gas fuel. Depending on the operating mode of the acoustical sprayer, the fractional composition of the liquid sprayed may have larger or smaller particles. This allows the sprayer to be used not only for combustion of fuel, but also to increase the moisture content of steam at the intake to a steam-gas turbine and in other technical installations. A cross-sectional diagram of the acoustical nozzle is presented.

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USSR

VALETSCHIK, L. A. and STEPANENKO, YE. YU.

ON THE QUESTION OF MEASUREMENTS OF AVERAGED PARAMETERS IN TURBULENT JET FLOWS

Kiev SB NAUCH TR KIEV IN-T INZH GRAZHD AVIATSII [Collection of Scientific Works of Kiev Institute of Civil Aviation Engineers] in Russian, No 5, 1969 pp 50-60

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B 1347 by B. I. Bakum]

[Text] The authors give combined and simultaneous (by thermal anemometer and total pressure nozzle) measurements of the averaged velocities during an experimental investigation of an axisymmetric jet with closely arranged screen. For the true readings they took the ones from the thermal anemometer. They demonstrated that the total pressure nozzle gives errors which grow with increase in stream turbulence. Thus, for example, the exponent as a function of change in maximal velocity from the distance along the axis of the jet was equal to -1.07 for thermal anemometer measurements and -1.23 for measurements by the total pressure nozzle. The radial profiles of velocity in the various cross sections along the jet axis, measured by the two given methods, also differed. References 6.

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USSR

UDC 620.171

PERMYAKOV, A. K., KOROLEV, P. M., Gor'kiy Aviation Plant

MEASUREMENT OF DEFORMATION BY MEANS OF MOLDS WITH COORDINATE GRIDS

Moscow ZAVODSKAYA LABORATORIYA in Russian No. 3, 1976 pp 343-344
manuscript received 10 Jan 75

[Abstract] A method is suggested for measurement of deformations using a coordinate grid with flexible patterns taken from the surface of the metal. The working mixture for the production of the pattern is a solution of celluloid film in acetone with black enamel added for color. The method can be used with a coordinate grid produced by scratching or chemical etching. The method was used by the authors to determine deformation over a grid applied to a metal sheet by scratching. The use of flexible patterns allowed the accuracy of measurement to be increased by 2-3% in comparison to measurement under a microscope. The main advantage of the method is the reduction in labor consumption of measurements, as well as the possibility of measurement in areas difficult to reach with a microscope.

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USSR

UDC 622.011.4;622.023

ZURABISHVILI, I. I., and MATARADZE, E. D.

SEISMIC-BLAST OSCILLATIONS OF THE ROOF OF MINE TUNNELS AND THEIR ACTION ON SHORING

Tbilisi TEKHNLOGIYA DOBYCHI I OBOGASHCHENIYA POLEZNYKH ISKOPAYEMYKH GRUZII
 [Technology of Extraction and Enrichment of Mineral Resources of Georgia,
 Collection of Works] in Russian, "Metsniyereba," 1975 pp 21-29

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V770 by
 V. N. Kostyuchenko]

[Text] The paper gives some results of an experimental study of the intensity of seismic oscillations accompanying blasting in ore strata. Measurements showed that the velocity of vertical oscillations on the bare surface of a longwall roof is defined by the expression

$$U_z = Kq^{0.5}r^{-1.5}, K = 124-140.$$

Here q is the weight of the charge in kg, r is the distance from the point of the blast in m. The amplitude of these oscillations damps out quickly with depth, so that at a depth of 2-2.5 m the velocity of displacement is

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USSR

ZURABISHVILI, I. I. and MATARADZE, E. D., TEKHNLOGIYA DOBYCHI I OBOGASHCHENIYA POLEZNYKH ISKOPAYEMYKH GRUZII, "Metsniyereba," 1975 pp 21-29

10-12 times less than on the surface. This circumstance makes it possible to use a simplified scheme in calculating shoring for seismic loads. In accordance with this simplified scheme the shoring is treated as a system with one degree of freedom and a mass equal to that lying above the rock. The rigidity of the shoring is determined from solution of the known problem on oscillations of an elastic system under the effect of loads of various types. In particular, an examination is made of two limiting cases where steady-state oscillations are set up in the system, or where the system is calculated for an impulse load. In conclusion, known formulas are given for elastic-plastic beams. References 7.

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USSR

KOBRUSHKO, A. T.

STUDY OF THE RELATIVE RATE OF MOTION OF GAS IN OIL GUSHER ELEVATORS
BASED ON COMMERCIAL DATA

Moscow GEOL I RAZRABOTKA NEFT MESTOROZHD. KOMI ASSR. SER NEFTEGAZ
GEOL I GEOFIZ [Geology and Development of Petroleum Deposits. Komi
ASSR. Series Geology and Geophysics, Collection of Works] in Rus-
sian, 1975 pp 64-70

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6B1058
by S. N. Zakirov]

[Text] According to data from an investigation of water-free wells
in the West Tebuksk Deposit (Komi ASSR) the author constructs the
dependences of production of oil gusher elevators on the end face
pressures with a constant pressure at the opening.

He constructs an approximate theory for computing the oil gusher
elevator. This theory assumes the possibility of ignoring hydrau-
lic losses in the elevator. The gas is assumed to be ideal and obey-
ing Henry law. The gas in any cross section of the elevator is sep-
arated in the form of bubbles of identical diameter. The amount of

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USSR

KOBRUSHKO, A. T., GEOL I RAZRABOTKA NEFT MESTOROZHD. KOMI ASSR. SER
NEFTEGAZ GEOL I GEOFIZ, 1975 pp 64-70 [From REFERATIVNYY ZHURNAL,
MEKHANIKA No 6 1976 Abstract No 6B1058]

forming bubbles in a certain cross section is inversely proportional
to the pressure in this cross section. The rate of buoyancy of the
gas bubbles obeys Stokes law. They expand under isothermal condi-
tions.

The results of the computations are compared with the actual data
given above. For West Tebuksk and also for the Pashinsk and Usinsk
Deposits the best agreements between computed and actual data exist
for a relative rate of motion of the gas phase of 0.3 m/s.

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USSR

UDC 629.78.017.2

MOROZOV, V. M., FORMAL'SKIY, A. M.

SOME PROBLEMS FROM THE THEORY OF CONTROL AND STABILITY OF MOTION

NEKOTORYYE ZADACHI TEORII UPRAVLENIYA I USTOYCHIVOSTI DVIZHENIYA
in Russian Moscow, Moscow University Press, 1975, 147 pp

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 6, 1976 Abstract No.
6.41.55K by T. A. YE.]

[Text] This collection includes articles dedicated to certain aspects of control theory and the stability of motion of mechanical systems. The first seven articles study problems from the theory of control of motion. The articles of A. M. Formal'skiy and V. YE. Ryzhovoy concern problems of the theory of optimal control with several criteria characterizing the quality of control. The criteria here are the time required to reach the goal of control and the expenditure of resources by the control organs. In the first work, linear stationary systems of arbitrary order are studied, in the second -- a specific second order system, describing the rotation of a solid body around an axis passing

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USSR

MOROZOV, V. M., FORMAL'SKIY, A. M., NEKOTORYYE ZADACHI TEORII
UPRAVLENIYA I USTOYCHIVOSTI DVIZHENIYA Moscow University Press, 1975
147 pp

through its center of mass. The problem of absolute stability is important in the theory of automatic control. The article of V. V. Aleksandrov and V. N. Zhermolenko applies variational methods to the investigation of the absolute stability of nonlinear controlled third-order systems. Using these methods, necessary and sufficient conditions are produced for absolute stability of such systems. In the article of L. S. Gnoyenskiy for a one-dimensional tracking system, a minimax problem is stated; the solution of this problem allows synthesis of control for which the system tracks the input signal in a manner which is optimal in some sense. In the article of M. V. Groshevaya and V. A. Samsonov, variational methods are used to produce estimates of the accuracy of determination of the orientation of a

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USSR

MOROZOV, V. M., FORMAL'SKIY, A. M., NEKOTORYYE ZADACHI TEORII
UPRAVLENIYA I USTOYCHIVOSTI DVIZHENIYA Moscow University Press, 1975
147 pp

satellite. It is shown that analysis of forces acting on the
satellite can greatly refine the accuracy of its orientation.

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USSR

UDC 531.8

AKULOV, V. YA.

DETERMINATION OF GROUPED EXCESS CONSTRAINTS AND MOBILITIES IN SPHERICAL
MECHANISMS

TRUDY ALTAYSKOGO POLITEKHNICHESKOGO INSTITUTA [Works of Altay Polytechnical
Institute] in Russian No 44, 1975 pp 73-77

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4A175 by
F. M. Dimentberg]

[Text] Excess constraints is the term applied to those whose removal does
not change the mobility of a mechanism. The presence of excess constraints
is not always desirable since they complicate manufacture and reduce reli-
ability. Grouped excess constraints are those that exist for several loops
of a multiple-loop mechanism. Using equations of closure of spherical mecha-
nisms with consideration of several loops, the author derives equations of
constraint and establishes the rank of the matrix of the system, from which
he determines the number of excess constraints. An example is given of cal-
culation for a two-loop spherical mechanism.

USSR

PAVLOV, V. I.

ANALYSIS OF CLAMPS OF ASSEMBLY MANIPULATORS MM-1 AND MM-2

TR VNII PO MONTAZH I SPETS STROIT RABOTAM [Works of the All-Union Scientific Research Institute of Assembly and Special Construction Works] in Russian, No 15, 1975 pp 107-113

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6A229]

[Text] The author examines questions associated with the fastening of objects to be manipulated in clamps of assembly manipulators MM-1 and MM-2. He cites the results of investigations of clamps from the All-Union Scientific Research Institute on Assembly and Special Construction Works in determining the stresses and angle of gripping. He gives recommendations for changing the stress of gripping as a function of the size of the cross section of the object. Author's abstract.

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USSR

UDC 621.373.535

KOZYREV, D. A., KOROLENKO, P. V. and SARKAROV, N. E., Physics Department of Moscow State University

THE DISTORTION OF THE SPATIAL DISTRIBUTION OF THE RADIATION FIELD OF AN He + Ne LASER WITH MULTILAYER DIELECTRIC MIRRORS

Moscow PRIBORY I TEKHNIKA EKSPERIMENTA in Russian, No 2, Mar-Apr 76, pp. 168-169 manuscript received 4 July 75

[Abstract] A study is made of the influence of heterogeneity of the transmission factor of multilayer dielectric mirrors on the distribution of the intensity of a laser beam. It is shown that phenomena related to the reflection of light in the substrates of the laser mirrors may lead to significant distortions in the field structure of the radiation. These distortions in the structure of the laser beam lead in many cases to serious difficulties in practical operations. For example, in systems requiring careful matching of the laser beam to the parameters of some other device (regenerative optical quantum amplifier, scanning Fabry-Perot interferometer, waveguide line), structural distortions of the laser beam may lead to significant energy losses and excitation of parasitic transverse types of oscillation in the system.

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USSR

UDC 539.374;539.214

CHERNIY, VL. P.

ON ELASTIC-PLASTIC BENDING OF CURVED THIN-WALLED PIPES

TRUDY VSESOYUZNOGO NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA PO STROITEL'STVU
MAGISTRAL'NYKH TRUBOPROVODOV [Works of the All-Union Scientific Research
Institute on Construction of Pipe Mains] in Russian No 30, 1974 pp 118-125

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V473 by
V. I. Van'ko]

[Text] A method of solving the problem of elastic-plastic bending of thin-walled pipes with curvilinear axis (in the form of a circular arc) is proposed within the framework of the nonlinear semimomentless theory of shells. It is assumed that the components of deformation are made up of two terms: a component calculated on the assumption of pure bending of the pipe without changing the cross sectional shape, and components due to deformation (flattening) of the cross section. It is assumed that the longitudinal deformations are distributed in accordance with a plane law. The pipe material is elastic-plastic, the relation $\sigma_i \sim \epsilon_i$ (stress and strain intensities) being expressed by a parabolic dependence. The solution is

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USSR

CHERNIY, VL. P., TRUDY VSESOYUZNOGO NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA
PO STROITEL'STVU MAGISTRAL'NYKH TRUBOPROVODOV, No 30, 1974 pp 118-125

constructed by the method of elastic solutions using nonlinear kinematic relations of the theory of thin shells of moderate flexure due to Mushtari and Galimov. Trigonometric expansions of the unknown quantities are used. References 7.

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USSR

UDC: 539.376

ODQVIST, F. K. G.

ON A HILL ESTIMATE OF THE RATE OF STEADY-STATE CREEP

Moscow MEKHANIKA DEFORMIRUYEMYKH TEL I KONSTRUKTSIY [Mechanics of Deformable Bodies and Structures, Collection of Works] in Russian, "Mashinostroyeniye," 1975 pp 367-372

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V506 by the author]

[Text] Theorems of the minimum for the potential U and the additional potential \bar{U} , as noted by Hill, may be used under certain conditions for direct evaluation of the total deformation of steady-state creep or the total average external load for a given rate of creep on the boundary. An examination is made of the case of steady-state creep, disregarding the instantaneous elastic and primary deformation of creep. Upper and lower estimates are found for the functions U and \bar{U} , that are completely independent of the true solution of the boundary value problem. In the absence of body forces it is shown that in the case of zero stresses on the surface S_T the total dissipation of energy is bounded, while in the case of zero

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USSR

ODKVIST, F. K. G., MEKHANIKA DEFORMIRUYEMYKH TEL I KONSTRUKTSIY, "Mashinostroyeniye," 1975 pp 367-372

displacements on the surface S_y the additional dissipation of energy is bounded. Precise upper and lower estimates of the creep rate under the action of a concentrated force are found for Norton's material. Use of the resultant estimates is demonstrated by an example. References 6.

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NOVOZHILOV, V. V.

CONCERNING THE OUTLOOK FOR THE PHENOMENOLOGICAL APPROACH TO THE PROBLEM OF DESTRUCTION. (A REPORT TO THE INTERNATIONAL CONGRESS ON MECHANICS, MOSCOW, AUGUST 1972)

Moscow MEKHANIKA DEFORMIRUYEMYKH TEL I KONSTRUKTSIY [Mechanics of Deformable Bodies and Structures, Collection of Works] in Russian, "Mashinostroyeniye," 1975 pp 349-359

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V585 by the author]

[Text] It is noted that the limitation on information does not permit construction of an orderly modern statistical theory of plastic deformation and destruction of materials. This situation makes it necessary to work out phenomenological theories of destruction. Destruction is treated as an irreversible process that must be described by differential relations of a nonholonomic nature. Within the framework of the scalar variant a general theory is proposed for the destruction of elastic-plastic bodies that is a synthesis of the theory of damage accretion and the theory of brittle fracture.

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USSR

NOVOZHILOV, V. V., MEKHANIKA DEFORMIRUYEMYKH TEL I KONSTRUKTSIY, "Mashinostroyeniye," 1975 pp 349-359

This theory is expressed mathematically in two components: 1) in the form of an equation of damage accretion that includes a quantitative characteristic of the Bauschinger effect, 2) in the form of a criterion of brittle fracture, assuming that the breaking stress is dependent on the damage accumulated in plastic deformation.

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KUSTER, M. E. and METSAVEER, YA. A.

AN ALGORITHM FOR CALCULATING THE ECHO SIGNAL FROM AN ARBITRARY CYLINDRICAL SHELL

Tbilisi TRUDY DESYATTOY VSESOYUZNOY KONFERENTSII PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975 [Works of the Tenth All-Union Conference on the Theory of Shells and Plates, Kutaisi, 1975] in Russian, "Metsniyereba," 1975 pp 247-254

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V223 by M. M. Dargeyko]

[Text] The paper presents a combined numerical-analytical method of calculating the echo signal of a probe pulse of the plane wave type from an elastic cylindrical shell with cross section in the form of an arbitrary smooth closed curve. Shell motion is described by a theory of the Timoshenko type.

The solution is sought in the space of Fourier images. The medium surrounding the shell is conditionally separated into inner and outer regions. The solution for the wave equation in the outer region is sought in the form of a Fourier series. The solution in the inner region is found numerically

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USSR

KUSTER, M. E. and METSAVEER, YA. A., TRUDY DESYATTOY VSESOYUZNOY KONFERENTSII PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975, "Metsniyereba," 1975 pp 247-254

by a finite difference method. As a result of "splicing" the solutions for the inner and outer regions, a system of algebraic equations is obtained that contains, in addition to the coefficients of the Fourier series, the unknown values of pressure and also the displacements of the shell at the computational grid intersections. References 5.

2/2

ALEKSANDROV, A. YA., VALUYSKIKH, V. P. and LAZAREV, I. B.

OPTIMUM REINFORCEMENT OF VARIABLE THICKNESS AROUND AN ELLIPTICAL HOLE IN A PLATE

Tbilisi TRUDY DESYATOY VSESOYUZNOY KONFERENTSII PO TEORII OBOLOCHEK I PLASTIN. KUTAISI, 1975 [Works of the Tenth All-Union Conference on the Theory of Shells and Plates, Kutaisi, 1975] in Russian, "Metsniyereba," 1975 pp 412-421

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V195 by N. A. Kulakov]

[Text] A search is made for the weight-optimum reinforcement of an elliptical hole in an infinite plate under biaxial compression or tension. The solution is found by the method of finite elements via calculation of a disk of sufficiently great radius. Assumed as limitations are conditions of transition of the material to the ductile state (the Mises or Trask stress intensities must not exceed the corresponding values at infinity), and also the upper and lower limit of plate thickness. For the case where a limitation is introduced on the upper range of plate thickness the problem is formulated in terms of nonlinear programming and is solved by a random search method.

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USSR

ALEKSANDROV, A. YA., VALUYSKIKH, V. P. and LAZAREV, I. B., TRUDY DESYATOY VSESOYUZNOY KONFERENTSII PO TEORII OBOLOCHEK I PLASTIN. KUTAISI, 1975, "Metsniyereba," 1975 pp 412-421

The concentration coefficient is given and the relief of equal-strength reinforcement is shown for different ductility criteria, cases of fastening and thickness limitations.

2/2

USSR

MAKHUTOV, N. A.

KINETICS OF THE DEVELOPMENT OF LOW-CYCLE FRACTURE AT ELEVATED TEMPERATURES

Moscow ISSLED MALOTSIKLOV PROCHNOSTI PRI VYSOK TEMPERATURAKH [Investigation of Low-Cycle Strength at High Temperatures, Collection of Works] in Russian, Izd-vo Nauka, 1975 pp 99-123

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V1447 by A. P. Gusenkov]

[Text] A method is developed for computing the cyclical strength at high temperatures. Computation at the stage of formation of a fatigue crack is done using a Landger type equation in which the effect of asymmetry of the loading cycle is introduced. The parameters of the equation depend on temperature, level of the strength properties of the material, frequency and deformation time. Analytical expressions were proposed for accounting for this influence. Computations were made for the fracture curves for various conditions of long-cycle deformation of type 18-8 steel. For evaluation of reaching limiting state for fracture in the zones of concentration the author uses a modified Nabor dependence. On its basis he analyzes the changes in the coeffi-

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USSR

MAKHUTOV, N. A., ISSLED MALOTSIKLOV PROCHNOSTI PRI VYSOK TEMPERATURAKH, 1975 pp 123 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V1447]

cients of stress and strain concentration outside the limits of elasticity as a function of the time of high-temperature holding. The stability at the stage of spread of the crack of long-cycle fracture is computed using the approaches of the mechanics of fracture with the introduction of the dependence of rate of spread of the crack on the deformation properties and in particular the coefficient of intensity of deformations. Computations were made of the rate of spread of the crack as a function of the duration of the loading cycle. References 69.

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USSR

TRIFONOV, V. P., BART, YU. YA., KOZACHENKO, A. B. and MALININ, N. I.

ON THE QUESTION OF DEFORMATION CRITERIA OF THE LONG-TERM STRENGTH OF VISCO-ELASTIC MATERIALS

Moscow NAUCH TR IN-T MEKH. MOSK UN-TA [Scientific Works of the Institute of Mechanics, Moscow University] in Russian, No 37, 1975 pp 84-86

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 607 by I. M. Kershteyn]

[Text] The authors propose presenting the criterion of long-term strength in the form

$$\int_0^{t^*} f(t^* - \tau) \varphi[\dot{\epsilon}(\tau)] d\tau = 1$$

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USSR

TRIFONOV, V. P., BART, YU. YA., KOZACHENKO, A. B. and MALININ, N. I., NAUCH TR IN-T MEKH. MOSK UN-TA, No 37, 1975 pp 84-86 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V607]

where t^* is the time to fracture, $f(x)$ is the function of influence, $\varphi(x)$ is the function which takes into account the nonlinearity of the material properties, $\dot{\epsilon}$ is the rate of deformation. The authors describe the procedure of determining the functions $f(x)$ and $\varphi(x)$ from tests in which the sample is fractured either at one fixed rate of deformation or with impulse change in the rate of deformation (height of each impulse is precisely the same). For one polymer material an example is given of the computations. Here the functions f and φ were found possible to use in power form. It was shown that the linear criterion agrees worse with the obtained experimental data than its suggested nonlinear generalization.

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USSR

SMOLIN, YU. YE.

COMPUTATION OF FLEXIBLE RIGIDLY PLASTIC CROSSED RODS BY ALLOWING FOR THE PHYSICAL AND GEOMETRICAL NONLINEARITY

Tomsk MATERIALY 5-Y NAUCH KONF PO MAT I MEKH. TOMSK UN-T. T 2 [Materials from the Fifth Scientific Conference on Mathematics and Mechanics. Tomsk University. Vol 2, Collection of Works] in Russian, Izd-vo Tomsk University, 1975 p 140

[From REFERATIVNYY ZHURNAL, MEKHANIKА No 6 1976 Abstract No 6V 494]

[Text] The author examines the problem of computing the carrying capacity of a system of flexible rigidly plastic crossed rods by allowing for the physical and geometrical nonlinearity. The load on the system is assumed as arbitrarily determined, and in the process of the solution is brought to a nodal one. Computation is done according to the limiting state. For the computational scheme of the system a discrete model is taken which consists of components (hinges) and rectilinear rods in contact with the components.

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USSR

SMOLIN, YU. YE., MATERIALY 5-Y NAUCH KONF PO MAT I MEKH. TOMSK UN-T. T 2, 1975 p 140 [From REFERATIVNYY ZHURNAL, MEKHANIKА No 6V 494]

Using extremal energy principles of the theory of limiting equilibrium the problem is reduced to a problem of mathematical programming. Author's abstract.

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USSR

NARUSBERG, V. L. and RIKARDS, R. B.

CONCERNING ONE PROBLEM OF STABILITY OF A SHELL WITH VISCO-ELASTIC FILLER

Leningrad TR IX VSES KONF PO TEORII OBOLOCHEK I PLASTIN, 1973
[Works of the Ninth All-Union Conference on the Theory of Shells and Plates, 1973] in Russian, Izd-vo Sudostroyeniye, 1975 pp 140-142

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 375 by V. I. Van'ko]

[Text] The authors derive equations of the quasistatic process of bulging of an orthotropic cylindrical shell with a filler whose properties are described by linear equations of a visco-elastic body with heritage. Here the tangential stresses acting from the side of the filler on the shell are not taken into account in the computation and the filler itself is considered to be incompressible.

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USSR

NARUSBERG, V. L. and RIKARDS, R. B., TR IX VSES KONF PO TEORII OBOLOCHEK I PLASTIN, 1973, 1975 pp 140-142 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V375]

Solution to the problem of a shell with initial irregularity loaded with a longitudinal compressible force is constructed in the form of a trigonometric series. Here for each harmonic there exist two characteristic values of the effective force -- the instantaneous T_0 and the long-term T_∞ . Acted on by the force $T < T_\infty$ the growth in amplitude of the corresponding harmonic has a damping character. If a force $T_\infty < T < T_0$ exists, the amplitude grows with increasing speed. When $T \geq T_0$ an instantaneous loss in stability occurs.

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USSR

VOLOSOVICH, O. V. and TIMASHEV, S. A.

EXPERIMENTAL AND STATISTICAL INVESTIGATION OF THE STABILITY OF
RECTANGULAR CONVEX SHELLS

Tyumen' TR TYUMEN INDUSTR IN-T [Works of Tyumen' Industrial Institute] in Russian, No 40, 1974 pp 170-173

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V
334 by V. V. Kabanov]

[Text] This article contains the results of a statistical investigation of the influence of initial irregularities in the shape of spherical shells which are rectangular in the plane on the amounts of critical external pressure and form of stability loss. The investigation was conducted on twenty models made of an aluminum alloy with a coating on a textolite starting sheet. The models had side rigidity elements. The boundary conditions corresponded to the free support for part of the models over the entire contour, for another part -- over the angles. The external pressure was created by a fine fraction. The initial irregularities were measured by a spherometer. They had the form of individual depressions, similar in shape to elliptical ones. The mean amplitudes of the

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USSR

VOLOSOVICH, O. V. and TIMASHEV, S. A., TR TYUMEN INDUSTR IN-T, No 40, 1974 pp 170-173 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V334]

initial bends did not exceed 0.15 of the thickness of the shells. The measured irregularities were treated by the method of selective transformations and local scanning for clarification of the major harmonics. All shells lost stability by the formation of a uniform angular ellipsoidal depression. For further loading the shells were reversed. The ratio of load during reversal to critical load of the local stability loss was 1.5-2. Histograms of the critical loads with a distribution near normal are given.

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USSR

ANDREYEV, L. V. and OBODAN, N. I.

LARGE BENDS IN CYLINDRICAL SHELLS UNDER A NONAXISYMMETRICAL LOAD

Leningrad TR IX VSES KONF PO TEORII OBOLOCHEK I PLASTIN, 1973
[Works of the Ninth All-Union Conference on the Theory of Shells
and Plates, 1973] in Russian, Izd-vo Sudostroyeniye, 1975 pp 112-
114

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V
307 by O. I. Terebushko]

[Text] In a geometrically nonlinear formulation the authors solve
the problem of determining the bends in a cylindrical shell sub-
jected to the effect of external pressure which varies in the ang-
ular coordinate by the law

$$p = p_0 \sum_n a_n \cos n \beta$$

They use approximate relationships between the deformations and
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USSR

ANDREYEV, L. V. and OBODAN, N. I., TR IX VSES KONF PO TEORII OBO-
LOCHEK I PLASTIN, 1973, 1975 pp 112-114 [From REFERATIVNYY ZHURNAL,
MEKHANIKA No 6 1976 Abstract No 6V307]

shifts pertaining to the theory of the center bending of shells.
In addition in obtaining the original equations the authors ignore
the second derivative of the characteristic quantities along the
longitudinal coordinate in comparison with the second derivative
of these quantities along the angular coordinate. Dividing the
variables and presenting the unknown function in the form of a
trigonometric series along the angular coordinate, the authors
obtained a system of ordinary differential nonlinear equations
which were then integrated by the Newton method. As the zero ap-
proximation the used the solution in the form of an expansion over
the eigenfunctions. They give the results of computation for a
shell with parameters $R/h = 200$, $l/R = 4$ (R is the radius, l is
the length, h is the thickness) for several given laws of pressure
distribution over the circular coordinate.

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USSR

CHIRKOV, V. P.

RANDOM OSCILLATIONS OF PLATES WITH CONCENTRATED MASSES

Leningrad TR IX VSES KONF PO TEORII OBOLOCHEK I PLASTIN, 1973
[Works of the Ninth All-Union Conference on the Theory of Shells
and Plates, 1973] in Russian, Izd-vo Sudostroyeniye, 1975 pp 233-
235

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V
265 by L. S. Pal'ko]

[Text] The author examines oscillations of a thin visco-elastic
plate, carrying concentrated masses and located in a field of
normal random forces presented in the form of space-time Fourier
integral.

They obtained formulas for determining the space-time probability
characteristics of the field of normal shifts for infinite plates
and plates of finite dimensions by allowing for the distortions
introduced by the concentrated masses. He gives examples of com-
puting the probability characteristics of the field of shifts in

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USSR

CHIRKOV, V. P., TR IX VSES KONF PO TEORII OBOLOCHEK I PLASTIN,
1973, 1975 pp 233-235 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6
1976 Abstract No 6V265]

systems with continuous and discrete spectra of the eigen frequen-
cies on the assumption that the external load acts as a spatial
white noise or furthermore an acoustical field.

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USSR

BUSLOV, YE. P., ZHUKOV, A. I., MAKIYENKO, V. F., PARAMONOV, K. G.,
RUDNEVA, V. N. and SKURLATOV, E. D.

EXPERIMENTAL INVESTIGATION OF THE BEHAVIOR OF CONICAL SHELLS UNDER A DYNAMIC LOAD

Leningrad TR IX VSES KONF PO TEORII OBOLOCHEK I PLASTIN, 1973
[Works of the Ninth All-Union Conference on the Theory of Shells and Plates, 1973] in Russian, Izd-vo Sudostroyeniye, 1975 pp 363-365

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 247 by A. V. Khromushkin]

[Text] The authors present the results of an experimental investigation on the dynamic stability of thin elastic conical shells acted on by an exponential pressure wave with a flat front. The pressure wave front moves along the axis of the shell. The shells were prepared by a lathe method from AMg-6 material. In the process of the experiments measurement was made of the dynamic deformations and parameters of the external load. For a series of identical shells the authors experimentally obtained the boundary of stability presented in the coordinates p_{ξ} -I (p_{ξ} is the pressure on the surface of the shell; I is the pressure impulse), which may

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USSR

BUSLOV, YE. P., ZHUKOV, A. I., MAKIYENKO, V. F., PARAMONOV, K. G.,
RUDNEVA, V. N. and SKURLATOV, E. D., TR IX VSES KONF PO TEORII OBO-
LOCHEK I PLASTIN, 1973, 1975 pp 363-365 [From REFERATIVNYY ZHURNAL,
MEKHANIKA No 6 1976 Abstract No 6V247]

be approximated by a hyperbola. They investigated the character of the wave formation during loss in stability of the shell for various parameters of the external dynamic load. References 8.

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USSR

KRUGLYAKOVA, V. I. and MAL'KOV, V. M.

INVESTIGATION OF THE INFLUENCE OF BOUNDARY CONDITIONS ON THE DEFORMATION OF PIPES WITH A CURVILINEAR AXIS

Leningrad TR IX VSES KONF PO TEORII OBOLOCHEK I PLASTIN, 1973
[Works of the Ninth All-Union Conference on the Theory of Shells and Plates, 1973] in Russian, Izd-vo Sudostroyeniye, 1975 pp 70-73

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V159 by V. P. Il'yin]

[Text] The authors give the results of solving the problem of bending of a curvilinear thin-walled pipe by a boundary load of general type by allowing for the different conditions of reinforcing the end cross sections. They discuss the question of dividing the stress-strain state of the pipe into the basic state and the state such as a simple boundary effect. They examine the solution for the basic state for three variations of boundary conditions at the ends: rigidly attached ends of a curvilinear pipe coupled with long straight pipes. They discuss the results of

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USSR

KRUGLYAKOVA, V. I. and MAL'KOV, V. M., TR IX VSES KONF PO TEORII OBOLOCHEK I PLASTIN, 1973, 1975 pp 70-73 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V159]

computing the values of the coefficients of reduction in rigidity of the curvilinear pipes with various geometric parameters during bending in the plane of curvature of the longitudinal axis of the pipe. They give the numerical data on the coefficients of pliability of the pipes bent from the plane of the curvature under the effect of forces and moments. References 10.

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USSR

BARSUKOV, V. N.

ON THE CONSTRUCTION OF THE THEORY OF MULTILAYER MILDLY SLOPING SHELLS

Kazan' SB ASPIRANTSK RABOT. KAZAN UN-T TOCHN NAUKI. MATEMATIKA. MEKHANIKA [Collection of Graduate Student Works. Kazan' University of Precision Sciences. Mathematics. Mechanics] in Russian, 1975 pp 177-183

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 125 by F. A. Kogan]

[Text] The author examines the bending of thin elastic isotropic mildly sloping multilayer shells (see Daragan, V. I. and Sachenkova, A. V. in the Collection, Investigations on the Theory of Plates and Shells, No 8, Kazan' University, 1972, pp 96-109, REFERATIVNYY ZHURNAL, MEKHANIKA, No 4 1973 Abstract No 4V256). The distribution of transverse shifts $\varepsilon_{iz}^{(s)}$ over the thickness of the shell is given in a form which satisfies the equations of equilibrium and the conditions on the external surfaces

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USSR

BARSUKOV, V. N., SB ASPIRANTSK RABOT. KAZAN UN-T TOCHN NAUKI. MATEMATIKA. MEKHANIKA, 1975 pp 177-183 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V125]

$$\varepsilon_{iz}^s = \sum_{k=1,3,5,\dots}^s \varphi_i^k(x_1, x_2) \cos \frac{\pi k z}{2h_s} \quad (i = 1, 2)$$

here $2h_s$ is the thickness of the shell; s is the index of the external layers. The author takes into account the squeezing along the thickness of the shell. The conditions on the surfaces of contact of neighboring layers are satisfied. Formulas are obtained for the shifts and deformations of the layers. It is mentioned that the equations of equilibrium under the conditions and moments are obtained from the variational principle of Lagrange.

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USSR

UDC 624:539.4

NIKOLAYENKO, N.A., BAGMANYAN, A.L., and UL'YANOV, S.V.

USING ANALOG COMPUTERS IN PROBLEMS OF THE OSCILLATIONS OF NONLINEAR AND PARAMETRIC SYSTEMS ACTED UPON BY DYNAMIC FACTORS

TRUDY TSNII STROITEL'NYKH KONSTRUKTSIY [Works of the Central Scientific Research Institute of Structural Parts] in Russian No 44 1975 pp 4-29

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V1155 (resume)]

[Text] The authors discuss problems related to the investigation of the random trajectories of motion of nonlinear and parametric systems of a given class acted upon by dynamic factors of the seismic type (and others) with the help of analog computers. These problems are quite urgent ones for the theory of the seismic stability of structures. The authors developed block diagrams for modeling dynamic systems with variable structures on an analog computer. They explain their general-purpose method for forming a dynamic memory according to the current phase coordinates, and discuss the problem of the accumulation of disturbances and modeling the worst effects for the 1/2

USSR

NIKOLAYENKO, N.A., BAGMANYAN, A.L., et al., TRUDY TSNII STROITEL'NYKH KONSTRUKTSIY No 44 1975 pp 4-29

investigated class of dynamic systems. They analyze the motion of systems with a variable structure (elastoplastic systems, systems with disengaging connections, combined systems) for typical deterministic and random dynamic factors. The authors then use the results of this analysis to evaluate the adaptation and maximum capabilities (confidence limits of feasibility and correctness) for using the investigated theoretical models as a function of the latters' structural features and information on the disturbances acting upon them. References 27.

USSR

UDC 624.072.2

KHOLOPOV, I.S.

SOME QUESTIONS ON THE OPTIMIZATION OF BAR-TYPE METAL DESIGNS WITH RESPECT TO COST

Kuybyshev RASCHET PROSTRANSTVENNYKH STROITEL'NYKH KONSTRUKTSIY [Designing Spatial Structural Parts, Collection of Works] in Russian No 5 1975 pp 240-248

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V969 by V.P. Malkov]

[Text] The author discusses the problem of planning bar-type metal designs of minimum cost C , including plant cost of the manufactured articles and installation costs. As limitations, he discusses the conditions of continuity of deformations at points where the superfluous unknowns X_i are introduced. Introducing the definition of the i -th bar's volume as the ratio $v_i = U_i/u_i$, where U_i is the energy of the deformations in the i -th bar and u_i is the specific potential energy level, the author minimizes the specific cost function $C = C(U)$. References 6.

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USSR

UDC 624.011:539.4

LYAKHTER, V.M.

EVALUATING THE SEISMIC STABILITY OF HYDRAULIC ENGINEERING STRUCTURES

TRUDY VSESOUZNOGO PROYEKTNO-IZYSKATEL'NOGO I NII "GIDROPROYEKT" [Works of the All-Union Planning, Surveying and Scientific Research Institute imeni S.Ya. Zhuk] in Russian No 44 1975 pp 100-129

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V1054 (resume)]

[Text] The author briefly describes the directions and basic results of investigations in the area of seismology and the seismic stability of hydraulic engineering structures that were formulated in Gidroproyekt's Department of Dynamic Research from 1971 to 1973. He presents the results of the theoretical solutions that were reached and data obtained during experimental investigations. References 19.

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USSR

UDC 539.375

VISHNEVSKAYA, T.A., and CHERNYAVSKIY, V.L.

ON THE QUESTION OF INVESTIGATING ANNEALING-CRACK FORMATION IN MODELS

TRUDY KOORDINATSIONNOGO SOVESHCHANIYA PO GIDROTEKHNIKE [Works of the Coordinating Council on Hydraulic Engineering] in Russian No 103 1975 pp 109-115

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V586 (resume)]

[Text] The authors discuss the question of applying the linear mechanics of fracture to investigations of hydraulic engineering structures utilizing models. They propose a condition for crack resistance during the study of questions relating to the appearance and development of annealing cracks that is in the form $K_I \leq K_{Ic}$, where K_I is the coefficient of stress intensity in the neighborhood of the crack's mouth and K_{Ic} is its critical value, at which further crack growth takes place. They present the results obtained from an investigation of the effect of the test pieces' dimensions, the lengths of the cracks, and the composition of the gypsum modeling material on 1/2

USSR

VISHNEVSKAYA, T.A., and CHERNYAVSKIY, V.L., TRUDY KOORDINATSIONNOGO SOVESHCHANIYA PO GIDROTEKHNIKE No 103 1975 pp 109-115

the critical value of the stress intensity coefficient. The authors find a correlational relationship between K_{Ic} and the material's strength under axial tension R_p , and make recommendations for choosing test piece dimensions when testing modeling materials in this fashion. References 7.

USSR

UDC 624.131+539.215

VISHNEVETSKIY, E.M., GLIKIN, I.D., KOBIYEV, V.G., KOZACHEVSKIY, A.I., and SINYAVSKIY, A.L.

AN INVESTIGATION OF THE STRESS-DEFORMED STATE OF THE FOUNDATION SLAB UNDER A 16-STORY RESIDENTIAL BUILDING

SOPROTIVLENIYE MATERIALOV I TEORIYA SOORUZHENIY. RESPUBLIKANSKIY MEZHVEDOMSTVENNIY NAUCHNO-TEKHNICHESKIKH SBORNIK [Strength of Materials and the Theory of Structures; Republic Interdisciplinary Scientific and Technical Collection of Works] in Russian No 27 1975

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V715 (resume)]

[Text] The authors investigate the stress-deformed state of the foundation slab of a multistory residential building that is acted upon by vertical loads transmitted through transverse and longitudinal rigidity diaphragms. They compare the numerical results obtained by different methods of calculation. Based on an analysis of these results, they make recommendations for applying the indicated techniques to designing slabs on an elastic base, allowing for the specific nature of the structure on the foundation. References 5.

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USSR

UDC 539.374

RAKHMATULIN, KH.A., and ADYLOV, K.A.

PROPAGATION OF ELASTOPLASTIC LONGITUDINAL WAVES IN A ROD WITH A PIECEWISE-SMOOTH LIMIT OF ELASTICITY

Moscow TRUDY MEKHANIKO-MATEMATICHESKOGO FAKUL'TETA MOSKOVSKOGO UNIVERSITETA [Works of the Mechanics and Mathematics Faculty of Moscow University] in Russian No 1 1975 pp 87-93

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V529 by Yu.V. Suvorova]

[Text] The authors discuss the problem of the propagation of elastoplastic waves in a semi-infinite rod, the material of which is deformed in accordance with Prandtl's system, it being the case that for the part of the rod $0 \leq x \leq x_s$, the flow limit σ_s , ϵ_s is higher than for the rest of the rod $x_s \leq x \leq \infty$, while the slopes of both the elastic and plastic sections of the diagrams are identical. It is assumed that at moment of time $t = 0$, a load σ_0 is instantaneously applied to cross-section $x = 0$ and maintained at a constant level for a period of time τ , after which it is instantaneously removed.

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USSR

RAKHMATULIN, KH.A., and ADYLOV, K.A., TRUDY MEKHANIKO-MATEMATICHESKOGO FAKUL'TETA MOSKOVSKOGO UNIVERSITETA No 1 1975 pp 87-93

The authors solve the problem by the method of characteristics, with sequential determination of the stress-deformed state by areas. They find the distribution of the rod material's flow limit after establishing a steady-state motion regime. They calculate the change in particle velocity, deformations, and stresses during the shock process in some cross-section $x_0 < x_s$, and compare the results with experimental data. References 5.

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USSR

UDC 624.07:534.1

SIMONOV, V.I., and MAKSIMOV, A.A.

AN INVESTIGATION OF THE OSCILLATIONS OF A THICK-WALLED RING FASTENED ALONG ITS OUTER DIAMETER AND ACTED UPON BY INDUCED VIBRATIONS

Chelyabinsk SBORNIK NAUCHNYKH TRUDOV CHELYABINSKOGO POLITEKHNICHESKOGO INSTITUTA [Collection of Scientific Works From the Chelyabinsk Polytechnic Institute] in Russian No 159 1975 pp 199-201

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V304 by L.A. Magerramova]

[Text] The authors present the results of their experimental investigation of the oscillations of a thick-walled rubber ring. The ring, which was 230 mm in diameter and 40 mm thick, had a central hole bored through it and was fastened along its outer diameter to an absolutely rigid shell. The authors investigated the vertical oscillations caused by forward displacements of the shell according to the harmonic law, with frequencies of 15-60 cps and overloads from 1 to 4. By using reference grids superimposed on the studied parts' lateral surfaces, the authors were able to obtain diagrams of the oscillations' shapes. They determined the four lowest shapes of the oscillations of rings with slotted, star-shaped, and circular holes, but they give diagrams only for a ring with a circular central hole.

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USSR

UDC 533.6.013.42

PEREKHREST, V.I.

ON MATCHING THE BOUNDARY CONDITIONS AND EXACT SOLUTIONS OF THE HYDRO-ELASTICITY EQUATIONS FOR A CYLINDRICAL SHELL

Tbilisi TRUDY X VSESOYUZNOY KONFERENTSII PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975 [Works of the 10th All-Union Conference on the Theory of Shells and Plates; Kutaisi, 1975] in Russian, Izd-vo Metsniyereba, 1975 pp 300-309

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V395 by K.G. Kravtsov]

[Text] The author explains his technique for solving the problem of the vibrations of a liquid in circular shells for a broad class of conditions for securing the shell's edges; it is based on the use of the Green function for a semi-infinite cylinder containing a liquid. The velocity potential is given as the sum of the potential of the disturbed movements of a liquid in a rigid container and the potential caused by the walls' elastic oscillations. Axially symmetric modes of motion are discussed separately from those that are not

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PEREKHREST, V.I., TRUDY X VSESOYUZNOY KONFERENTSII PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975, Izd-vo Metsniyereba, 1975 pp 300-309

symmetric. The author derives equations of the Lagrange type for wave motions of the liquid, with due consideration for satisfying the boundary conditions on the free surface for given modes of shell wall displacements. He calculates the associated masses of the liquid for the provisionally discussed cases of long and short shells and compares the applicability of such a division in the general case. References 9.

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VERYUZHSKIY, YU.V., and SAVITSKIY, V.V.

A GENERAL APPROACH TO THE SOLUTION OF VARIOUS PLATE FLEXURE PROBLEMS
BASED ON THE POTENTIAL METHOD

Tbilisi TRUDY X VSESOYUZHNOY KONFERENTSII PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975 [Works of the 10th All-Union Conference on the Theory of Shells and Plates; Kutaisi, 1975] in Russian, Izd-vo Metsniyereba, Vol 1 1975 pp 42-50

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V227 by V.M. Kulakov]

[Text] The authors explain their method for reducing boundary-value problems of the flexure of plates with an arbitrary shape to integral equations containing unknown values of the displacements and forces on the plate's contour that are in the form of elastopotential densities. They discuss the flexure of thin and medium-thickness plates and slabs lying on an elastic vinklerovskoye [probably Winkler] foundation. They analyze the continuity properties of the functions represented by the elastopotentials during a discussion of the axially symmetric flexure of an elastic, ring-shaped circular plate lying on $1/2$

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VERYUZHSKIY, YU.V., and SAVITSKIY, V.V., TRUDY X VSESOYUZHNOY KONFERENTSII PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975, Izd-vo Metsniyereba, Vol 1 1975 pp 42-50

an elastic base and loaded along its inner periphery by uniformly distributed moments. The numerical realization of the potential method is achieved with the help of a general-purpose program developed for a digital computer of the BESM-6 type. In order to make a comparative analysis of designs of plates with essentially angular points, the authors studied the flexure of a triangular plate with a large circular cutout with spherical supports along its outer edge that is acted upon by bending moments that are uniformly distributed along its outer edge. They also discuss the application of the potential method to the investigation of the elastoplastic flexure of plates. References 9.

USSR

UDC 539.3

RYABOV, N.S.

A TECHNIQUE FOR DESIGNING SHELLS COMPOSED OF FLAT ELEMENTS AND COUPLED WITH SUPPORTING AND REINFORCING TRUSSES

TRUDY TSNII STROITEL'NYKH KONSTRUKTSIY [Works of the Central Scientific Research Institute of Structural Parts] in Russian No 38 1975 pp 34-54

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V178 (resume)]

[Text] The author discusses a rectangular casing shell with positive curvature that consists of flat elements and rests on supporting trusses, the upper chords of which lie in the same plane. As the mathematical model of the flat elements he uses the differential equations from the plane problem of the theory of elasticity and a flexed plate. Allowing for symmetry, the problem reduces to the conjugation among themselves of five flat elements and two trusses that constitute one-fourth of the shell. The chosen system of coordinate functions satisfies the problem's differential equations
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USSR

RYABOV, N.S., TRUDY TSNII STROITEL'NYKH KONSTRUKTSII, No 38 1975 pp 34-54

exactly and does not satisfy the boundary conditions and conjugation conditions for each element. The coordinate functions' parameters are found by the method of variations, according to the coordinate functions of the effect of the absence of tying-in. The author compiles a matrix of the algebraic system of equations' coefficients that is in the form of definite integrals. References 7.

USSR

UDC 539.3

ARASLANOV, A.M.

ON DESIGNING PLATES AND SHELLS WITH A GIVEN RELIABILITY WHILE ALLOWING FOR THE ACCUMULATION OF FATIGUE DAMAGES

Kazan' TRUDY KAZANSKOGO AVIATIONNOGO INSTITUTA [Works of the Kazan' Aviation Institute] in Russian No 189 1975 pp 16-20

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V209 (resume)]

[Text] The author discusses the planning of designs with a given reliability, using thin, rigid plates and symmetrical shells as an example. A failure mechanism in the form of a gradual accumulation of fatigue damages is assumed, and the linear theory of the accumulation of fatigue damages is applied. For loads representing a normal steady-state process, the author derives a formula for determining the reliability of a design. When given a required reliability level this formula can be used to find the plate (shell) thickness quite easily.

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USSR

FEDOROV, V. V.

ENERGY PRINCIPLES IN THE THEORY OF LONG-RANGE STRENGTH OF A SOLID BODY

Tashkent TR TASHKENT IN-TA INZH ZH-D TRANSP [Works of the Tashkent Institute of Engineers of Railroad Transportation] in Russian, No 111, 1974(1975) pp 77-83

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V1175 by I. M. Kershteyn]

[Text] The author develops a version of the energy theory of strength. For the criterion he takes the condition of reaching a critical value of the free energy in the sample. In deriving the basic relationships of the theory he uses the assumption of an activation nature of the processes of deformation and strengthening (cold hardening). In final form he obtains an expression for the lifetime of the sample under conditions of uniaxial stress by a constant load. He shows that in the region of low loads and relatively high temperatures this expression leads to a power dependence of lifetime on stress, observed experimentally during tests of rubber-like materials. In the area of high loads and low temperatures the obtained expression is reduced to an exponential dependence with parameters which depend on the physico-chemical properties

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FEDOROV, V. V., TR TASHKENT IN-TA INZH ZH-D TRANSP, No 111, 1974 (1975) pp 77-83 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V1175]

and structure of the material and also on the conditions of the test. A detailed discussion is given of the concept of the existence of a "physical fatigue limit" which follows from the basic relationships of the theory. By this latter we mean such a maximal stress at which the level of the free energy accumulated in the material for an infinite time of the loading effect does not exceed the critical value. References 11.

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USSR

ANENKOV, N. I. and ANUCHKIN, M. P.

EVALUATION OF THE STRENGTH OF MAIN PIPE LINES BY METHODS OF LINEAR FRACTURE MECHANICS

TR VNII PO STR-VU MAGISTRAL'N TRUBOPROVODOV [Works of the All-Union Scientific Research Institute of Construction of Main Pipe Lines] in Russian, No 30, 1974 pp 5-19

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V566 by A. N. Polilov]

[Text] The authors investigate the resistance to brittle fracture of pipes for main pipe lines of steels 17GS, 08G2SF and 19G1SF. They use ordinary criteria of linear fracture mechanics

$$K_1 = K_c \text{ and } G_1 = G_c.$$

In the formula for the coefficient of intensity of stresses K_1 takes into account the following corrections: plasticity near the tip of

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ANENKOV, N. I. and ANUCHKIN, M. P., TR VNII PO STR-VU MAGISTRAL'N TRUBOPROVODOV, No 30, 1974 pp 5-19 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V566]

the crack, curvature of the cylinder, biaxial stressed state and presence of dampers at the edges of the cylindrical samples. The tests were conducted on 720 and 1220 mm diameter pipes, with the thickness, respectively, of 7.5 and 12 mm. The length of the samples was 4-5 m, the edges of the cylindrical samples were sealed with spherical bottoms. In the testing process the authors fixed the pressure in the pipe, the temperature of the sample and the rate of propagation of the crack with the aid of sensors of current conducting paper. The surface notches were made with a constant length of 250 mm with a radius of curvature at the bottom of 0.5 mm. In the tests with growth in length of the crack the stresses decreased: the critical value of the stresses was obtained by extrapolation of the test data to zero crack velocity. Hydraulic and pneumatic tests were conducted. In the latter case the samples were partially drenched with water, and before fracture finished with air. The authors demonstrated that pneumatic loading leads to a smaller value of the critical length of the crack than hydraulic loading. They detected an increase in the critical length of the crack with growth in the diameter of the pipe and

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ANENKOV, N. I. and ANUCHKIN, M. P., TR VNII PO STR-VU MAGISTRAL'N TRUBOPROVODOV, No 30, 1974 pp 5-19 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V566]

from the test results they established empirical dependences between K_c and the impact viscosity. The cite data on the reserve of elastic energy of air necessary for fracture. References 13.

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USSR

ULITSKAYA, R. I. and SPIRIDONOV, V. V.

ON THE CONTROL OF OSCILLATIONS OF A MULTISPAN ABOVE-GROUND PIPELINE
IN A WIND CURRENT

Kuybyshev RASCHET PROSTRANSTV STROIT KONSTRUKTSII [Computation of
Three-Dimensional Structural Designs, Collection of Works] in Rus-
sian, No 5, 1975 pp 61-68

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V376
by K. G. Kravtsov]

[Text] The prevention of oscillations of segments of a pipeline
as a result of periodic collapse of eddies is possible by connect-
ing and increasing the number of supports so that the basic fre-
quency for the segment of the pipeline exceeds the value of the
predominant frequency of the eddy collapse for the largest compu-
ted wind velocity. It is most rational to use dampers of oscil-
lations in the middle of the increased spans. The authors theo-
retically analyze the conditions for the control forces which act
along with the distributed vertical perturbing load on a segment
of several spans. Release of the reactions in the supports inside

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USSR

ULITSKAYA, R. I. and SPIRIDONOV, V. V., RASCHET PROSTRANSTV STROIT
KONSTRUKTSII, No 5, 1975 pp 61-68 [From REFERATIVNYY ZHURNAL, ME-
KHANIKA No 3 1976 Abstract No 3V376]

the segment permits expressing the shift as a function of the con-
trol forces. Then the problem is reduced to determining the form
of these control effects in the presence of a limitation on the
maximal amplitudes of oscillations in the center of the spans.
This is associated with solution to the system of integral equa-
tions in the time region using the Laplace transforms. The auth-
ors mention that realization of dampers with the frequency charac-
teristics found is not an easy problem.

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USSR

PAVLOVSKIY, V. S. and FILIN, V. G.

ON THE STABILITY OF A CYLINDRICAL SHELL WITH A LIQUID UNDER CONDITIONS OF PARAMETRIC RESONANCES

Ivanovo VOPR MAT FIZ I TEORII KOLEBANIY. VYP 3 [Questions of Mathematical Physics and the Theory of Oscillations. No 3, Collection of Works] in Russian, 1975 pp 77-89

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V339 by A. G. Gorshkov]

[Text] The authors investigate the stability of oscillatory motion of a cylindrical shell partially filled with an ideal noncompressible fluid under longitudinal vibrational effects and under conditions of subharmonic resonances. The bottom is assumed to be flat and absolutely rigid. On the ends of the shell conditions of ball support are used.

The axisymmetrical oscillations generated on the free surface of the fluid take place with large amplitudes. For determination of the potential of the perturbed motion of the fluid the authors use

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PAVLOVSKIY, V.S. and FILIN, V. G., VOPR MAT FIZ I TEORII KOLEBANIY. VYP 3, 1975 pp 77-89 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V339]

known relationships. Motion of the shell is described by the equations of the moment technical theory of V. Z. Vlasov which are integrated by the Bubnov method. They obtain the conditions for onset of unstable resonance oscillations. References 9.

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USSR

ZYABREV, L. G., LOGUNOV, B. A. and MIODUSHEVSKIY, P. V.

AUTOMATION OF AN EXPERIMENT ON STATIC AEROTHERMOELASTICITY

Kiev AVTOMATIZ PROTSESSOV ISSLED V OBL MEKH SVOYSTV MATERIALOV I PROCHNOSTI KONSTRUKTIV ELEMENTOV [Automation of Processes of Investigation in the Area of the Mechanical Properties of Materials and Strength of Structural Elements, Collection of Works] in Russian, 1975 pp 142-152

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V327 by B. I. Bakum]

[Text] The authors describe an automated device which ensures conduction of investigations on static aerothermoelasticity outside a wind tunnel. The device consists of systems of automatic regulation of loading and heating, a specialized computer and a program device for assigning the original dependences of the thermal flux, temperature, velocity pressure, angle of attack and load on time. In the system of automatic regulation of loading as the servo mechanisms they use hydraulic power exciters, and for measurement of the stresses they use dynamometers with tensometric and potentiometric sensors. In the system of automatic regulation

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USSR

ZYABREV, L. G., LOGUNOV, B. A. and MIODUSHEVSKIY, P. V., AVTOMATIZ PROTSESSOV ISSLED V OBL MEKH SVOYSTV MATERIALOV I PROCHNOSTI KONSTRUKTIV ELEMENTOV, 1975 pp 142-152 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V327]

of heating they use blocks of infrared heaters on quartz lamps; for measuring the temperature they use thermocouples, and for measurement of the thermal fluxes they use specially developed sensors. For the purpose of unification both systems are made on the base of autogenerator operational amplifiers. The system of regulation error does not exceed 2%. The program device permits approximating any of the original functions by 12 sloped and 12 horizontal segments for a rate of measurement of the output signal from 0.2 to 20% sec⁻¹, a discreteness of 1% and a limiting error of 1%. In making control investigations on loading of a cantilever beam of constant rigidity using this device a good agreement with precise computation was obtained.

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USSR

ZIPALOVA, V. F. and YUDIN, A. S.

COMPARISON OF SCHEMES OF ALLOWING FOR REINFORCEMENTS DURING AN INVESTIGATION OF THE STABILITY OF A NON-FLAT SPHERICAL DOME

Tbilisi TR X VSES KONF PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975. T 1 [Works of the Tenth All-Union Conference on the Theory of Shells and Plates, Kutaisi, 1975. Vol 1] in Russian, Izd-vo Metsniereba, 1975 pp 610-618

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V254 by V. I. Mamay]

[Text] The authors discuss the sizes of the critical loads of a non-flat spherical dome that is rigidly restrained in contour and loaded with a uniform external pressure, the thickness of which along the meridian varies in a gradual variable manner. The investigation was conducted by a numerical method of the type of initial parameters in the framework of known equations in the theory of thin shells of E. Reyssner which describe the axisymmetrical deformation of shells of rotation. The authors examine three schemes of allowing for the salient parts of the shell: by diffusion, discretely and as a gradual change in its thickness. In

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ZIPALOVA, V. F. and YUDIN, A. S., TR X VSES KONF PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975. T 1, 1975 pp 610-618 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V254]

the discrete allowance of the reinforced rib the authors use the hypothesis of a single direct system of the shell-rib and static conditions of butting which are written with the aid of the principle of possible shifts. On the basis of the computations made the conclusion is drawn that for the reinforcement parameters investigated in the work the error in determining the critical load using the schemes of diffusion and discrete allowance for the rib may reach 10-20% to the safe side in comparison with the third scheme. References 5.

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USSR

FRIDMAN, L. I.

TRANSVERSE OSCILLATIONS OF ROUND PLATES ALLOWING FOR THE INERTIA OF ROTATION AND DEFORMATION OF SHIFT

Kuybyshev TR KUYBYSHEV AVIATS IN-TA [Works of Kuybyshev Aviation Institute] in Russian, No 67, 1974 pp 140-149

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V218]

[Text] The familiar system of equations of plate oscillations allowing for the inertia of rotation of shift in rectangular coordinates by the method of generating functions is reduced to two independent equations. Expressions are given for the deflections and angles through the generating functions. A system of equations is obtained for the oscillations of plates allowing for the inertia of rotation and shift in polar coordinates. The author demonstrates that the expressions for the unknown functions (deflection and angles of rotation) through the generating functions obtained in rectangular coordinates and transformed into polar coordinates satisfy

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FRIDMAN, L. I., TR KUYBYSHEV AVIATS IN-TA, 1974 pp 140-149 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V218]

the system of equations of oscillations.

Analytical expressions are obtained for the generating functions of a uniform problem in the case of circular and annular plates, i. e., natural shapes are found. As an example the authors give the frequencies of the circular plate with closed inner and free outer edges. A comparison is given of them with frequencies obtained on the basis of the Kirchhoff hypothesis. Solutions are given to the nonuniform problem in a series of natural shapes. References 5.

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USSR

BAGDASARYAN, V. V., KUZNETSOV, O. V. and MALYUTIN, I. S.

ON PARAMETRIC RESONANCE OF A CYLINDRICAL SHELL FASTENED BY LONGITUDINAL EDGES

Ivanovo VOPR MAT FIZ I TEORII KOLEBANIY. VYP 3 [Questions of Mathematical Physics and the Theory of Oscillations. No 3, Collection of Works] in Russian, 1975 pp 89-96

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V187 by D. V. Tarlakovskiy]

[Text] Based on the technical moment theory of shells of V. Z. Vlasov, the authors investigate the dynamic stability of a cylindrical shell attached by arbitrarily arranged longitudinal edges of different rigidity under the action of axial compressive forces. They assume the presence of radial and tangential stresses of interaction between the shell and the edges which permits allowing for the eccentricity of the arrangement of the edges relative to the middle surface. By expanding the shifts into a Fourier series the problem is reduced to an infinite system of ordinary differential equations. Numerical computations are done with

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USSR

BAGDASRYAN, V. V., KUZNETSOV, O. V. and MALYUTIN, I. S., VOPR MAT FIZ I TEORII KOLEBANIY. VYP 3, 1975 pp 89-96 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V187]

a truncated system having a matrix of the 15th order. They mention the complete coincidence of the regions of instability obtained by the given method for an unattached shell with the familiar solutions.

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USSR

KLOKOV, A. V. and NOVICHKOV, YU. N.

SEVERAL QUESTIONS IN THE DYNAMICS OF TWO-LAYER CYLINDRICAL SHELLS

Tbilisi TR X VSES KONF PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975 [Works of the Tenth All-Union Conference on the Theory of Shells and Plates, Kutaisi, 1975] in Russian, Izd-vo Metsniereba, 1975, pp 206-217

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V185 by V. K. Ivanov]

[Text] The authors derive equations for the dynamics of two-layer mildly sloping cylindrical shells by using the Kirchhoff-Love hypothesis for an internal orthotropic layer and by allowing for the transverse shift according to the Timoshenko model for an external isotropic layer. As a specific case of the obtained equations, they cite equations using the Kirchhoff-Love hypothesis for the entire packet. They solve the problem of natural oscillations of the two-layer cylindrical shell, freely supported on rigid contour rectangular in plane. They make a numerical analysis of the influence on frequency of natural oscillations of the forces of

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USSR

KLOKOV, A. V. and NOVICHKOV, YU. N., TR X VSES KONF PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975, 1975 pp 206-217 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V185]

inertia associated with the tangential shifts and rotation of the normal. They make a conclusion as to the possibility of ignoring the tangential forces of inertia and using for the approximate computations approximations based on the Kirchhoff-Love hypotheses for the entire packet. References 8.

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USSR

KUZNETSOV, O. V.

AXISYMMETRICAL WAVES IN CYLINDERS OF FINITE LENGTH

Ivanovo VOPR MAT FIZ I TEORII KOLEBANIY. VYP 3 [Questions of Mathematical Physics and the Theory of Oscillations, No 3, Collection of Works] in Russian, 1975 pp 96-102

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V87 by A. A. Gvozdev]

[Text] The author derives a dispersion equation for axisymmetrical waves propagating along an infinite uniform elastic round cylinder with a free side surface (the Pochhammer-Krie equation). He mentions that for real values of the frequency there exist complex roots of the dispersion equation (complex wave numbers). For a cylinder of finite length with free end faces he uses the representation of stresses in the form of a segment of a series of eigenfunctions of an infinite cylinder. The boundary conditions on the end surfaces are satisfied in a finite number of points. Equation of the determinant of the obtained uniform system of algebraic equations to zero gives an equation which connects the frequency to the

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KUZNETSOV, O. V., VOPR MAT FIZ I TEORII KOLEBANIY. VYP 3, 1975 pp 96-102 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V87]

length of the cylinder. The roots of this equation are used for the values of the eigenfrequencies of a finite elastic cylinder of the given length. In the computations the author kept six terms of expansion and the dependence of the results on the number of terms kept was not investigated. Curves are given which show the dependence of the eigenfrequencies found on the dimensionless length of the cylinder.

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KLOYZNER, S. M. and KOSMODAMIANSKIY, A. S.

NONLINEAR PROBLEMS OF THE BENDING OF PLATES IN THREE-DIMENSIONAL FORMULATION

Tbilisi TR X VSES KONF PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975, T 1 [Works of the Tenth All-Union Conference on the Theory of Shells and Plates, Kutaisi, 1975, Vol 1] in Russian, Izd-vo Metsniereba, 1975 pp 159-165

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V69 by K. V. Solyanik-Krass]

[Text] The authors examine the problem of the bending of thick plates of a nonlinearly elastic isotropic material. The flat faces of the plates are assumed to be free of external forces, and the side cylindrical surfaces are assumed to be loaded with stresses distributed symmetrically relative to the middle plane. It is assumed that the cubes of the derivatives of the finite shifts can be ignored in comparison with the derivatives themselves. They give a nonlinear system of equations of the problem in shifts and give its solution on the assumption that the vector of the shifts

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KLOYZNER, S. M. and KOSMODAMIANSKIY, A. S., TR X VSES KONF PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975, T 1, 1975 pp 159-165
[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V69]

and the components of the tensor of stresses are represented by absolutely converging series over a certain small parameter.

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USSR

RASSOKHA, A. A.

ON SEVERAL RELATIONSHIPS FOLLOWING FROM THE CONTINUAL SCHEME OF THE PROCESS OF DEFORMATION OF ANISOTROPIC SOLID BODIES

Khar'kov VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV, 1975, TEZISY DOKL [All-Union Conference on Automated Investigations of the Carrying Capacity and Long-Term Strength of Aircraft, 1975, Text of Reports, Collection of Works] in Russian, 1975 pp 154-155

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V33]

[Text] With the aid of the theory of aggregate states and the temperature-force analogy the author shows the consistency and validity of the scheme of the process of deformation, according to which deformation in the direction of extension in the uniaxial stressed state is divided into two components: $\varepsilon(1-2\mu)$ and $2\mu\varepsilon$. The second component of deformation ($2\mu\varepsilon$) in conjunction with the transverse deformations is associated with the flow of a solid medium, and the first -- with the property of "cracking", specific for solid bodies.

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USSR

RASSOKHA, A. A., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV, 1975, TEZISY DOKL, 1975 pp 154-155 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V33]

As follows from the suggested scheme of the process of deformation, for an anisotropic material it is possible to find the coefficient μ which in sense is similar to the Poisson coefficient of an isotropic material but different in extension in the various directions and invariant relative to the transverse directions:

$$\mu_j = \frac{E_i \nu_{ji}}{E_j} = \frac{E_k \nu_{jk}}{E_j} \quad (1)$$

and the difference in values of μ in the different directions of the anisotropic material is due to the anisotropy of the modulus of elasticity

$$\mu_j E_j = \mu_i E_i = E_i \nu_{ji} = E_j \nu_{ij} \quad (2)$$

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USSR

RASSOKHA, A. A., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV, 1975, TEZISY DOKL, 1975 pp 154-155 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V33]

where i and k are the indexes of directions in the anisotropic material, orthogonal to the direction with the index j (directions with indexes i and k are not necessarily normal to each other); ν and E are the coefficients of the transverse deformation and the modulus of elasticity.

Relationship (2) also follows from the assumption of the existence of an elastic potential and is well confirmed in practice. The comparison made of relationship (1) with the experimental data gives satisfactory results. For example, for 90 different positions of the Cartesian axes xyz in the SVAM 15:1 anisotropic composition material the mean arithmetic deviation of the experimental values of the coefficients of transverse deformations ν_{xz} , ν_{yz} from the theoretical ones (determined using (1)) is 30% which can easily be explained by errors in the experiment. Author's abstract.

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USSR

UDC 629.78.018.4

KHIL'CHENKO, A. G., KONDRATENKO, YE. A., DUDNIK, M. F.

HIGH SPEED MEASUREMENT SYSTEM FOR STRENGTH TESTING

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 Khar'kov in Russian pp 46-47

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No. 3.41.196 from the resume]

[Text] A modern method of creation of new machines calls for a significant volume of various types of testing of actual objects. The need to increase the quality and reduce the time of testing requires the creation of automated testing systems at today's level of analog and digital equipment. The Khar'kov-10 information and measurement system is designed to perform this task. Its main purpose is the collection of data from static testing of flight vehicles with up to 4000 primary transducers. The main units of the system are: the digital deformation meter, operating at 1-500 measurements per second, a processor which controls the operation of the system and provides two-way communication

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USSR

KHIL'CHENKO, A. G., KONDRATENKO, YE. A., DUDNIK, M. F., VSES KONF
AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI
LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 Khar'kov pp 46-47

with a digital computer, multichannel switches of types DRP-120, DRP-120R, DRP-120T, recording devices of types PL-80, PL-150P, a cassette type magnetic recorder. The processor of the system can perform eight single-cycle or eight group instructions. The processor is based on the microprogramming principal. Changing a microprogram memory unit allows one to change the algorithm of performance of instructions as a function of the type of testing for which the system is being used. An instruction is sent to the processor from the control panel or from an external device, including a computer. The processor is equipped with interfaces to match it to devices for selecting primary converters, a puncher, magnetic tape drive, or computer. A digital cassette magnetic recorder has been developed for the system, with a capacity of about $0.7 \cdot 10^6$ bits, providing for recording on a standard cassette at 60,000 bits per second, recording

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USSR

KHIL'CHENKO, A. G., KONDRATENKO, YE. A., DUDNIK, M. F., VSES KONF
AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI
LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 Khar'kov pp 46-47

the indications of the 4000 transducers with 14 full interrogation cycles. The carrier records testing and service information, including numbers of groups of transducers interrogated. Proper selection of units of the system and instructions allows the parameters of the system to be altered, so that it can be used for resource and dynamic testing. The system is equipped with testing, functioning, signaling, and indication devices. It is based on integrated micro-circuits.

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USSR

UDC 629.78.063:621.64

OYKIN, V. A.

THE NATURAL OSCILLATIONS OF A NEAR-CIRCULAR PIPE WITH PRELIMINARY STRESS

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 Khar'kov in Russian 1975 p 115

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3 1976, Abstract No. 3.41.188 from the resume]

[Text] A study is made of the problem of the natural oscillations of a near-circular pipe with an initially flat axial line. The initial state is assumed to be preliminarily stressed. Systems of differential equations of equilibrium are used to produce the values of forces and moments by an analytic method, which are then used in the equations for perturbed motion of the pipe. The Bubnov-Galerkin method is used to find the natural frequencies. Dependences of the oscillating frequencies on the parameters of the liquid flowing through the pipe and aperture

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USSR

OYKIN, V. A., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 Khar'kov 1975 p 115

angle of the pipe are produced. Comparison of the results produced with similar results for a circular pipe shows their essential difference. Calculations are performed on a BESM-4 computer.

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USSR

UDC 629.78.015.4

GRINEV, V. B.

OPTIMAL BARS ON AN ELASTIC BASE

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI
LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 Khar'kov 1975 in Russian
p 143

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3 1976, Abstract No.
3.41.183 from the resume]

[Text] Based on the Pontryagin maximum principle, necessary conditions for optimality are produced in problems concerning the outline of bars of minimum volume to support an assigned compressive load, and the outline of bars of assigned volume to support the maximum load. The qualitative peculiarities of these optimization problems are studied. Formulas are produced expressing the optimal rules for the change of the parameters of the cross section along the length of a bar through variable states. An energy characteristic is produced for the necessary conditions of optimality, based on their integral form.

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USSR

GRINEV, V. B., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I
DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 Khar'kov
1975 p 143

An algorithm is constructed for numerical optimization of bars on an elastic base by successive approximations in the space of variable function. An example is presented of the calculation of an optimal stringer, located in the compressed zone of the fuselage of an airplane.

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USSR

UDC 629.78.023.015.4

BEKH, L. P., MALKOV, V. P.

SOFTWARE FOR THE SOLUTION OF THE PROBLEM OF OPTIMIZATION OF AXI-SYMMETRICAL THINWALL STRUCTURES

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 in Russian Khar'kov 1975 pp 101-102

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No. 3.41.178 from the resume]

[Text] On the example of weight optimization of high pressure vessels of titanium alloys, the possibility is demonstrated of generating a program to solve the problem of design and optimization of load-bearing structures in the class of axisymmetrical thinwall structures. The material of the vessel is different in welded, annealed and base material areas. The properties of the material can change within the limits of each of these areas. The load can be distributed or concentrated. Planning may be conducted considering structural limitations. The following problems are studied: direct design of a structure in order to

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USSR

BEKH, L. P., MALKOV, V. P., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 Khar'kov 1975 pp 101-102

generate the reserve factor as to strength in discrete cross section; production of a discrete equal strength structure with an assigned reserve factor of strength in each cross section; planning of minimum weight structures with assigned geometry; determination of the optimal type of reinforcement of welded annealed zones (from the condition of minimal weight); planning of a vessel of minimum weight for an assigned volume. Analysis of states of the structure is conducted from the same standpoint by representation of the structure in the form of a composite of typical envelopes of rotation: cylindrical, conical, spherical, circular plates and rigidity ribs. The elements are joined by the method of forces. The problem of synthesis combines

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USSR

BEKH, L. P., MALKOV, V. P., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY
SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY
DOKL 1975 Khar'kov 1975 pp 101-102

the problem of seeking the optimal continuous parameters for planning with fixed geometry (by an iterational process) and the problem of seeking the optimal geometric form (by using global search algorithm). The characteristics of the set of programs written in computer code for the BESM-4 (M-222) computer and in the languages ALGOL-60 and FORTRAN are given. A study is made of the possibilities for arrangement of program into an automated planning system in order to solve various problems of optimization and for direct design of an axis-symmetrical thinwall structure.

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USSR

UDC 629.78.023.001

ARISTOV, M. V., PETUKHOV, L. V., TROITSKIY, V. A.

THE PLANNING OF AXISYMMETRICAL PLATES AND SHELLS OF MINIMAL WEIGHT

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI
LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 Khar'kov 1975 p 130

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No. 3.41.177 from the resume]

[Text] The problem of planning of elastic axisymmetrical plates and shells of rotation with limitations on stresses and displacements is stated and solved as a variational problem of the theory of optimal control. The minimizing goal function is the weight (volume) of the structure. Necessary conditions for optimality are produced. The solution of edge problems for a system of differential equations coupling phase coordinates and a conjugate system for Lagrange factors is produced by the run-through method. Optimization is performed using a first order gradient procedure. Examples are presented of numerical calculations of plates and shells. Rules of distribution of thickness

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USSR

ARISTOV, M. V., PETUKHOV, L. V., TROITSKIY, V. A., VSES KONF AVTOMATIZ
ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N
APPARATOV 1975 TEZISY DOKL 1975 Khar'kov 1975 p 130

for optimal plates and shells are found, indicating a significant
weight savings of optimal structures in comparison to structures of
constant thickness (about 40% for plates and about 70% for shells).

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USSR

UDC 629.78.023.015.4

GAVRILENKO, G. D., SITNIK, A. S.

STRESS-STRAIN STATE OF RIBBED CYLINDRICAL ENVELOPES WITH APERTURES

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI
LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 Khar'kov 1975 pp 173-174

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No.
3.41.172 from the resume]

[Text] A method is developed for numerical calculation (using the
method of grids) of a heterogeneous stress and strain field in ribbed
cylindrical envelopes with large rectangular apertures. The envelopes
are supported by stringers and ribs, the aperture also is reinforced
around its edges with cables. The solution is produced considering the
discrete nature of placement of ribs based on a mixed method, that is
using force functions and functions of radial displacements. An
algorithm for calculation is suggested and used to prepare a program
for calculation of the bending, forces and moments both in the ribs and
in the envelope. The results of the solution of series of problems

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USSR

GAVRILENKO, G. D., SITNIK, A. S., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 Khar'kov 1975 pp 173-174

for envelopes subjected to longitudinal compression are analyzed. The convergence of the solutions is numerically estimated as the grid becomes denser. A comparison is presented with a solution (based on bends and longitudinal forces) found by the method of finite elements. Conclusions are drawn concerning the applicability of the method of grids and the method of finite elements to the design of ribbed cylindrical envelopes with rectangular apertures.

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USSR

UDC 629.78.023.015.4

IVCHENKO, YE. V., MAKEYEV, YE. M.

THE STRENGTH OF A CYLINDRICAL ENVELOPE IN CONTACT INTERACTION WITH A NONLINEARLY ELASTIC SUPPORT

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBIOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL Khar'kov 1975 p 173

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No. 3.41.168 from the resume]

[Text] A study is made of a thin wall cylindrical envelope supported by a number of ribs and experiencing a transverse load in the form of radial and tangential stresses applied to the ribs. At the place where one of the ribs is installed, the envelope rests on a circular bed with arbitrary area. The bed and cylindrical envelope contact each other through a nonlinearly elastic liner, not coupled to the envelope. The problem is solved with the following simplifying assumptions: the ribs deform only in their own plane; the axis of the rib is not extensible in bending; the cylindrical envelope is a semizero-moment

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USSR

IVCHENKO, YE. V., MAKEYEV, YE. M., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBIOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL Khar'kov 1975 p 173

envelope. The specific problem is reduced to solution of an integral Fredholm equation of the first kind, the solution of which is sought in the form of Fourier series. The problem of the stress-strain state of the envelope is reduced to solution of an infinite system of algebraic equations for the amplitudes of the radial displacements of the rib beneath the support. The nonlinear problem is solved by the method of successive approximations. The algorithm of the solution is programmed in AKI language for a Minsk-22 computer. Based on the analysis of the results of calculation of the specific structure, it is shown that the local strength of the envelope beneath the support depends essentially not only on the support load, but also on the rigidity and geometric characteristics of the support, its location and the general loading plan of the envelope. In connection with the results produced, problems are discussed concerning refinement of the calculation and test plans used for thin wall structures, operating in contact with elements of various compliances.

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USSR

UDC 629.78.023.015.4

LAVRINENKO, V. A., RYABCHENKO, V. M.

DESIGN OF NONCLOSED REINFORCED ENVELOPES WITH ARBITRARY BOUNDARY CONDITIONS USING A FINITE-ELEMENT METHOD OF FORCES

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL Khar'kov 1975 p 146

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No. 3.41.167 from the resume]

[Text] A method is suggested for design of nonclosed envelopes of an isotropic material with a single-layer shell reinforced in the longitudinal and transverse directions by rigidity ribs. A discrete calculation plan is used: the ribs are effective, the sections of the envelope on the boundaries are loaded only by tangential forces. The longitudinal ribs are considered to be zero-moment structures. The bonds of the envelope are free, due to which the external load must be self-balancing. It consists of concentrated forces and moments acting in the planes of the ribs, and an arbitrary system of boundary conditions, possible at the limits of the calculation plan

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LAVRINENKO, V. A., RYABCHENKO, V. M., VSES KONF AVTOMATIZ ISSLED
NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV
1975 TEZISY DOKL Khar'kov 1975 p 146

selected. Calculation is conducted by the method of forces. The possible eccentricity of transverse reinforcement is considered. A method is suggested for effective selection of statistically possible and self-balancing stress states. The self-balancing Π -systems suggested have the maximum localization in comparison with other known self-balancing states of the method of forces. A study is made of an algorithm and program, and results of calculations produced on a digital computer are discussed. The program is intended for use in complex programs for the calculation of complex fuselages with separation into substructures and complex programs for optimization of certain types of thin wall load-bearing structures.

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USSR

UDC 629.78.023.002

ODINOKOV, M. YU.

DETERMINATION OF THE RESIDUAL RADIUS OF CURVATURE DURING BENDING OF
CYLINDRICAL ENVELOPES OF VARIABLE THICKNESS

TR KAZAN AVIATS IN-TA in Russian 1975, No. 184 pp 53-59

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No. 3.41.248 from the resume]

[Text] The elastic recovery of shape following bending of parts of sheet metal influences the accuracy of the process of shape formation to a significant extent. Calculation of the elastic recovery during bending of envelopes of variable thickness by methods known from the theory of cylindrical bending yields significant errors in many cases. A method is suggested for calculating the elasticity factor considering the peculiarities introduced by the variable thickness along the generatrix. The use of the method suggested for planning of bending technological equipment allows elastic recovery to be considered with greater accuracy. 3 figures; 6 references.

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USSR

GUROK, YA. G.

INVESTIGATION OF THE SHAPE OF A BOUNDARY SURFACE OF ELASTIC HALF-SPACE DURING SYMMETRICAL IMPRESSION OF A ROUND STAMP

Gomel' VOPR YESTESTV I TEKHN NAUK. VYP 2 [Questions of Natural and Technical Sciences. No 2, Collection of Works] in Russian, 1975 pp 58-60

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V35 by M. Z. Narodetskiy]

[Text] An investigation was conducted for the case when the surface of the base of a stamp after immersion into a half-space has the equation $z = b - A \varrho^c$, $c > 0$ (b is the strict shift of the stamp). In particular the author examined the case when the vertical shifts in the points of the boundary surface have an extremum and when the shifts tend monotonically to zero with increase in ϱ .

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USSR

ANDREYEV, L. V., LEBEDEV, A. G. and OBODAN, N. I.

Tbilisi TR X VSES KONF PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975, T 1 [Works of the Tenth All-Union Conference on the Theory of Shells and Plates, Kutaisi, 1975, Vol 1] in Russian, Izd-vo Metsniereba, 1975 pp 431-438

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V110 by A. M. Vasil'yev]

[Text] The authors examine the finite-element formulation of a geometrically nonlinear problem on bending of a thin elastic cylindrical shell (or plate), bounded by a complex multi-connected contour consisting of parallel coordinate lines of segments. The recurrent relations obtained in the work between the nodal values of the functions on neighboring elements permit reducing the problem for the entire region to a sequence of problems for the individual elements. An example is given of the computation of the finite shifts during axial compression of the cylindrical panel with a notch. References 5.

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USSR

GRIGOLYUK, E. I., POPOVICH, V. YE. and PUKHLIY, V. A.

ON A COMPUTATION OF ANISOTROPIC CYLINDRICAL PANELS WITH A TRAPEZOID CONTOUR

Tbilisi TR X VSES KONF PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975 [Works of the Tenth All-Union Conference on the Theory of Shells and Plates, Kutaisi, 1975] in Russian, Izd-vo Metsniereba, 1975 pp 558-569

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V153]

[Text] An approximate method of integrating systems of differential equations with variable coefficients of common type, developed by the authors, is extended to the case of anisotropic cylindrical shells. The system of equations relative to the function of stresses and normal shift by the Bubnov-Vlasov variational method is reduced to a system of ordinary differential equations with variable coefficients, the analytical solution to which will be constructed in the future as a modified method of successive approximations. They investigate the bending of anisotropic cylindrical shells with a trapezoid contour. Authors' abstract.

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USSR

ODINOKOV, M. YU.

DETERMINATION OF THE PERMANENT RADIUS OF CURVATURE DURING THE BENDING OF CYLINDRICAL SHELLS OF VARIABLE THICKNESS

Kazan' TR KAZAN AVIATS IN-TA [Works of Kazan' Aviation Institute] in Russian, No 184, 1975 pp 53-59

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V455]

[Text] The elastic recovery of a mold during the bending of parts of a sheet to a significant degree influences the accuracy of the shaping process. Computation of the amount of elastic recovery during the bending of shells of variable thickness by methods familiar from the theory of cylindrical bending gives a substantial error in a number of cases. A method is suggested for computing the amount of springiness by allowing for features introduced by variability in thickness along the generatrix. Use of the suggested method in planning flexible technological equipment permits allowing for the elastic recovery with great accuracy. References 6. Author's abstract.

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USSR

KUZNETSOV, V. A. and SAMARIN, YU. P.

TWO-DIMENSIONAL PROBLEM OF SHORT-TERM CREEP FOR A MEDIUM WITH RANDOM RHEOLOGICAL CHARACTERISTICS

Tbilisi TR X VSES KONF PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975 [Works of the Tenth All-Union Conference on the Theory of Shells and Plates, Kutaisi, 1975] in Russian, Izd-vo Metsniereba, 1975 pp 241-246

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V481 by V. S. Namestnikov]

[Text] The authors examine short-term creep of a plate, the material of which follows the theory of flow of gradual type with random distribution of the properties of the material. They state that with high indicators of the steps (about 7%) the scatter in stresses around the mean values is 3-14%, and at low indicators of the step ($n \approx 0$) in the limits of 8-38%, hence the authors make the conclusion as to the necessity of taking into account the random heterogeneities of the material in estimating the strength under creep conditions.

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USSR

TARASOV, V. I. and KARDASHEV, G. A.

INFLUENCE OF SHOCK LOADS ON MATERIALS WITH DIFFERENT ACOUSTICAL PROPERTIES

Moscow TR MOSK IN-TA KHIM MASHINOSTR [Works of Moscow Institute of Chemical Machine Building] in Russian, No 60, 1975 pp 128-129

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3V1216 by N. A. Veklich]

[Text] The authors investigated the fracture of products of vulcanized rubber under the effect of impulse loading. The products were placed into a cooled working liquid. The pressure impulse was created in the liquid with the aid of a membrane which is the element of the electrodynamic impulse radiator. The products had a variable thickness. The thinner part was embrittled more rapidly during cooling. The wave, by propagating over the product from the side of the wider and more elastic part, at the boundary with the thin brittle part increased the intensity by several times. At this boundary the product was fractured which was made of the NO-68 rubber mixture at a temperature of cooling of -85° . The authors consider it possible with the aid of impulse effect to intensify the process of carrying out several of the finishing operations.

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USSR

UDC 539.214;539.374

YEROSHIN, V.I.

INTEGRAL CONTROL OF ELASTOPLASTIC DEFORMATION BY THE MATCHED SPATIAL FILTRATION METHOD

Chelyabinsk INTEGRAL'NYY KONTROL' UPRUGO-PLASTICHESKOY DEFORMATSII METODOM SOGLASOVANNOY PROSTRANSTVENNOY FILTRATSII [title as above] in Russian, Chelyabinsk Polytechnic Institute, 1975 8 pp manuscript received 8 Jan 76

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5V466 DYeP (resume)]

[Text] The author discusses the problem of measuring and monitoring elastoplastic deformation using the matched spatial filtration method, as well as experimental research that has been done with an interferometric device of the SIN type. In contrast to normal filtration methods, in which the holographic filter is struck by transmitted light, the filter is placed in reflected light; that is, directly at the section of the sample's surface where the deformations that are of interest.

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USSR

ANGEL'SHTOK, F. F. and VUL'FSON, I. I.

FEATURES OF THE DEVELOPMENT OF FRICTION SELF-OSCILLATIONS UNDER A VARIABLE NORMAL STRESS

Tallin TR TALLIN POLITEKHN IN-TA [Works of Tallin Polytechnic Institute] in Russian, No 381, 1975 pp 61-68

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6A126]

[Text] The authors examine the influence of inconstancy of a normal stress on the character of the friction self-oscillations. Increase in the normal stress may lead to loss in system dynamic stability accompanied by a growth of the amplitudes of quasiharmonic friction self-oscillations and subsequent transition to relaxation self-oscillations. Here the law of change in normal stress has no substantial significance. Authors' abstract.

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USSR

AMRAKHOV, A. N.

DYNAMIC TWISTING OF A CYLINDER ON THE LATERAL SURFACE OF WHICH
THE TANGENTIAL STRESSES ARE GIVEN

Moscow NAUCH TR IN-T MEKH MOSK UN-TA [Scientific Works of the Institute of Mechanics of Moscow University] in Russian, No 38, 1975 pp 19-22

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 98 by K. V. Solyanik-Krassa]

[Text] The author examines the dynamic problem of the propagation of torsion waves in a semi-infinite solid cylinder, the material of which is uniform and isotropic. It is assumed that at the end of the cylinder the tangential stress is given proportional to the radius, and on the lateral surface a certain load which appears at the moment of approach of the frontal wave of the shift. The solution to the equation of motion is applied to the cases when an annular tangential stress arises at a certain distance from the end to the lateral surface and when the forces of tangential stress proportional to the shift are given on the entire lateral surface.

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USSR

AMRAKHOV, A. N.

PROPAGATION OF TORSION WAVES IN A ROUND CYLINDER THAT IS IRREGULAR
ALONG THE LENGTH

Moscow NAUCH TR IN-T MEKH MOSK UN-TA [Scientific Works of the Institute of Mechanics of Moscow University] in Russian, No 38, 1975 pp 8-11

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 115 by V. D. Kubenko]

[Text] It is assumed that the modulus of shift and the density of an irregular orthotropic rod can be presented in the form of a certain constant quantity and function of the axial coordinate multiplied by a small parameter. The author examines two boundary problems for a semi-infinite rod: (1) the shift of the end is given as a function of time and the radial coordinate; (2) the tangential stress on the end is given in the form of an analogous function. Solution is found in the separated variables with the use of the Laplace transform in time and expansion over a small parameter. The zero and first approximations were computed. References 5.

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USSR

RUDYAK, M. V.

SOLUTION TO SEVERAL NONLINEAR PROBLEMS OF THE THEORY OF PLATES IN
THE CASE OF A SYMMETRICAL LOAD

Kiev VYCHISL MAT [Computer Mathematics, Collection of Works] in
Russian, 1975 pp 22-26

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V
189 by V. M. Kulakov]

[Text] In a previous work the author (Computer and Applied Mathematics, Interdepartmental Scientific Collection, 1970, No 12, pp 87-96, REFERATIVNYY ZHURNAL, MEKHANIKA No 6, 1971, Abstract No 6V 233) described the algorithm for solving nonlinear differential equations of the bending of rectangular plates under the effect of an arbitrary transverse load using the method of fractional steps. Here he examines plates under the effect of a load that is symmetrical with respect to the axes of symmetry. On the strength of the symmetry of the problem he proposes examining a fourth of a plate, in connection with which new conditions for the onset of a straight screw dislocation are derived.

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USSR

VAKHITOV, M. B., GRANKIN, YU. G. and SHEVCHENKO, V. P.

COMPUTATION OF ROUND PLATES OF VARIABLE RIGIDITY DURING NONAXI-
SYMMETRICAL LOADING

Kuybyshev VOPR PROCHNOSTI ELEMENTOV AVIATS KONSTRUKTSII, VYP 2
[Questions of the Strength of Aviation Structural Elements, No 2,
Collection of Works] in Russian, 1975 pp 13-23

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V
198]

[Text] Using the integral-difference method based on a combination of methods of direct and integrating matrices, the authors obtain matrix algorithms for computing the nonaxisymmetrical bending and flat stressed state of orthotropic thin round plates of arbitrarily variable rigidity loaded with a nonaxisymmetrical arbitrary external pressure and subjected to the effect of an arbitrary volume unbalanced temperature field. The computed points on the middle plane may be selected with arbitrary steps both in the radial and in the tangential directions. Numerical results are cited for solving a number of problems which illustrate the good precision of the above algorithms. References 7. Authors' abstract.

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USSR

PRIVARNIKOV, YU. K. and PRIVARNIKOVA, V. P.

PLANE-PARALLEL MOVEMENT OF AN ELASTIC BEAM WITH AN APPARENT MASS

Dnepropetrovsk Nelineyn Mekhanika. VYP 1 [Nonlinear Mechanics, No 1, Collection of Works] in Russian, 1975 pp 73-75

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 275]

[Text] The authors derive a system of differential equations of motion for a multimass model of a beam fastened on an apparent mass. By linearization the system is reduced to equations of small oscillations of beams (longitudinal and transverse), written in a difference formula. They give the method of allowing for the various conditions of fastening the edge of the beam. Authors' abstract.

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USSR

NEZVANOV, D. N. and KHAZANOV, KH. S.

INVESTIGATION OF THE REGION OF INSTABILITY OF A WAFFLE CYLINDRICAL SHELL

Kuybyshev VOPR PROCHNOSTI ELEMENTOV AVIATS KONSTRUKTSIY, VYP 2 [Questions of Stability of Aviation Structural Elements, No 2, Collection of Works] in Russian, 1975 pp 30-36

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 318]

[Text] The authors examine the stability of a waffle cylindrical shell loaded by axial compression in conjunction with internal pressure. From the general positions they determine the upper and lower critical loads which limit the region of shell instability. On the basis of numerical computer computations they investigate the character of change in the region of instability and obtain data on the influence of the internal pressure and structure of fastening the waffle shell for its carrying capacity. References 8. Authors' abstract.

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USSR

SHVAYKO, N. YU. and CHERNYAKOV, YU. A.

ON THE STABILITY OF ELASTO-PLASTIC EQUILIBRIUM OF COMPRESSED-TRUNCATED BEAMS

Moscow MEKH DEFORMIRUYEMYKH TEL I KONSTRUKTSIY [Mechanics of Deformable Bodies and Structures, Collection of Works] in Russian, Izd-vo Mashinostroyeniye, 1975 pp 520-527

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 372 by L. G. Korneychuk]

[Text] The authors investigate the problem of bifurcation of the state of elasto-plastic equilibrium of a compressed-truncated beam of circular cross section. For describing the law of relationship between the increments of stresses and the increments of strains the authors use the deformation theory of plasticity, the theory of flow, and also the differential-nonlinear relationships. They demonstrate that the results of the computations obtained on the basis of these latter relationships lie between the results corresponding to the theories of flow and small elasto-plastic strains. References 15.

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USSR

KRYUKOV, A. I. and ITBAYEV, V. K.

DETERMINATION OF THE CONDITIONS GENERATED DURING THE BENDING OF METAL SLEEVES

Ufa TR UFIM AVIATS IN-TA [Works of Ufa Aviation Institute] in Russian, No 46, 1975 pp 29-41

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 6 1976 Abstract No 6V 1020]

[Text] The authors investigate the strictness of a mechanism which deviates the tensor of the thrust of a rocket device. As a result of the investigation they explain the influence of internal pressure and structural parameters of the mechanism on the supplemental expenditures of power associated with deflection of the orientation engine by a given angle. Authors' abstract.

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GERSHTEYN, M. S.

ELASTIC WAVES IN A MULTILAYERED CYLINDRICAL SHELL WITH ANISOTROPIC LAYERS

Tbilisi TRUDY DESYATTOY VSESOYUZNOY KONFERENTSII PO TEORII OBOLOCHEK I PLASTIN, KUTAIISI, 1975 [Works of the Tenth All-Union Conference on the Theory of Shells and Plates, Kutaisi, 1975] in Russian, "Metsniyereba," 1975 pp 62-71

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V218 by A. S. Yerokhin]

[Text] A flat cylindrical shell of infinite length and regular structure is made up of a finite number of anisotropic reinforcing layers and layers of binder. Equations of motion in arbitrary curvilinear coordinates with consideration of rotational inertia and shear deformations, found by a variational method, are written out in final form. A linear law of displacements and deformations is assumed throughout the thickness of a layer. The equations of motion are linearized for the case of orthotropic layers and propagation of axisymmetric waves. The solution is found for harmonic wave propagation. Relations are given for phase velocity as a function of wavelength in a five-layer shell with specific physical parameters of the layers. References 6.

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PERTSEV, A. K. and LIOTKO, L. I.

ACTION OF AN INSTANTANEOUS PRESSURE PULSE ON A CYLINDRICAL SHELL

Tbilisi TRUDY DESYATTOY VSESOYUZNOY KONFERENTSII PO TEORII OBOLOCHEK I PLASTIN, KUTAIISI, 1975 [Works of the Tenth All-Union Conference on the Theory of Shells and Plates, Kutaisi, 1975] in Russian, "Metsniyereba," 1975 pp 260-273

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V225 by A. G. Gorshkov]

[Text] An investigation is made of the stress-strain state in a thin cylindrical shell loaded by an instantaneous pressure pulse. The pulse is uniformly distributed lengthwise of the shell, and is distributed by a cosine law in the peripheral direction. The shell pressure is described by equations of the linear theory of thin elastic shells based on the Kirchhoff-Love hypotheses. In the case where the shell rests freely on supports that are stationary in the radial direction the solution is constructed by using Fourier series and integral Laplace transformation (in time). In the case of securing of the ends of the shell, nonlinear equations of motion are used with integration by an implicit difference scheme. The influence of various parameters on characteristics of reactions is studied. References 5.

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USSR

UDC 539.3:534.1

POPOV, A. L. and CHERNYSHEV, G. N.

SHORTWAVE OSCILLATIONS OF SHELLS AND PLATES WITH CONVEX BOUNDARY

Tbilisi TRUDY DESYATOY VSESOYUZHNOY KONFERENTSII PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975 [Works of the Tenth All-Union Conference on the Theory of Shells and Plates, Kutaisi, 1975] in Russian, "Metsniyereba," 1975 pp 317-324

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V226 by V. P. Chirkov]

[Text] The paper gives an asymptotic solution of equations of free oscillations of plates and shells in the high-frequency region. An examination is made of the equations of shell oscillations for a rapidly changing stressed state in which the terms containing radii of curvature are omitted. Conditions of rigid clamping are taken as the boundary conditions. The equations are integrated by the method of asymptotic expansion of the sought functions with respect to integral and fractional inverse powers of the large frequency parameter. An analytical solution of the equations is found as well as an expression for the normal frequency in the first and second approximations.

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USSR

UDC 539.31:534.1

KABANOV, V. V. and KOROBEYNIKOV, S. N.

STABILITY OF A CYLINDRICAL SHELL UNDER COMPRESSION BEYOND THE ELASTIC LIMIT

Tbilisi TRUDY DESYATOY VSESOYUZHNOY KONFERENTSII PO TEORII OBOLOCHEK I PLASTIN, KUTAISI, 1975 [Works of the Tenth All-Union Conference on the Theory of Shells and Plates, Kutaisi, 1975] in Russian Vol 1, "Metsniyereba," 1975 pp 441-448

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V336 (from the article)]

[Text] Using relations of the theory of small elastic-plastic deformations written with consideration of inelastic compressibility of the material, an examination is made of the stability of a longitudinally compressed cylindrical shell. It is assumed that the subcritical state is under torque, and that buckling is not accompanied by load relief. An example is given of calculation of a hinged cylindrical shell with radius-to-thickness ratio of 100. It is shown that accounting for moments of force in the subcritical state reduces the critical value of the compressive force by 14%.

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USSR

UDC 539.214;539.374

STEL'MASHUK, V. N. and LUGININ, O. YE.

ON CONSTRUCTING A LOWER ESTIMATE FOR THE CARRYING CAPACITY OF RECTANGULAR PLATES

TRUDY NIKOLAYEVSKOGO KORABLESTROITEL'NOGO INSTITUTA [Works of Nikolayev Shipbuilding Institute] in Russian No 98, 1975 pp 25-31

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V434 by the authors]

[Text] Linear programming is used to find more precise lower limits of the ultimate load for rectangular uniformly loaded plates. An examination is made of the following problems of construction of the statically permissible solution when the fields of internal stresses (bending and twisting moments) are represented by polynomials: estimation of the necessary number of terms in series of internal stresses, influence of the accuracy of the piecewise-linear approximation of the yield surface, and organization of search for danger points on the field of the plate. The studies are done as applied to hinged and securely clamped square plates, and hinged plates with side ratios of 1:2 and 1:4. References 11.

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USSR

UDC 539.374

BESTUZHEVA, N. P.

RESONANT PHENOMENA IN NONLINEARLY ELASTIC BODIES

Kuybyshev MEKHANIKA DEFORMIROVANIYA TVERDOGO TELA [Mechanics of Deformation of Solids, Collection of Works] in Russian No 1, 1975 pp 37-41

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4V489 by the author]

[Text] A method of studying resonance phenomena is proposed that differs from the methods used in linear problems. The distinguishing feature of the given problem is that all results for the supersonic case are carried over to the subsonic case of motion of the load where the shocks occur on complex fronts. The resultant resonant velocity coincides with the rate of propagation of the surface waves of the corresponding linearized problem (elastic body with initial deformations).

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USSR

UDC 629.78.002.3.015.4

MAKEYEV, A. I., FOMICHEV, P. A., TRISHINA, L. A., KORUNA, G. S.

THE PROBLEM OF NONLINEAR ADDITION OF FATIGUE DAMAGE

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI
LETATEL'N APPARATOV in Russian 1975 TEZISY DOKL Khar'kov 1975, p 171

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No.
4.41.202 by A. V. U.]

[Text] This work is based on experiments on the block cyclic loading of materials. It is assumed that irreversible changes in the material are determined by the portion of the total dissipated energy ("dangerous" portion) for stresses over the fatigue limit and that the value of energy dissipated per cycle depends on the amplitude of the stresses and a certain function of the parameters of the material ($F(n)$). A form of the function $F(n)$ is suggested which depends on the total accumulated "dangerous" energy.

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USSR

UDC 533.697

YEVTEYEV, I. V. and SOLOKHIN, YE. V.

EXPERIMENTAL STUDY OF THE INFLUENCE OF REYNOLDS NUMBER ON SECONDARY LOSSES IN A FLAT COMPRESSOR CASCADE

[TRUDY] MOSKOVSKOGO AVIATIONNOGO INSTITUTA [(Works) of Moscow Aviation Institute] in Russian No 329, 1975 pp 15-21

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B945 by N. A. Kolesnikov]

[Text] The paper discusses the effect that the Reynolds number of a flow has on secondary losses in a flat compressor cascade due to growth of the wall boundary layer, the presence of a vortex couple near the jacket and sleeve of the axial compressor, and also the presence of a radial gap at the ends of the vane. An experimental study is made of the influence that the Reynolds number calculated with respect to the chord of a vane in the range $Re = (0.3-3.0) \cdot 10^5$ has on secondary losses and their separate components in a flat compressor cascade without radial clearance at zero angle of attack and Mach number equal to 0.3 in air. The following parameters are found: coefficient of total local losses, coefficient of total losses in a section

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USSR

YEVTEYEV, I. V. and SOLOKHIN, YE. V., TRUDY MOSKOVSKOGO AVIATIONNOGO INSTITUTA, No 329, 1975 pp 15-21

with respect to blade height, coefficient of total losses for the cascade, coefficients of blade and secondary losses. An analysis is made of the way that these coefficients depend on the Reynolds number of the flow. It is concluded that secondary losses decrease with decreasing Reynolds number and take up less and less vane height. This is due to the fact that secondary losses at low Reynolds numbers (no higher than $0.5 \cdot 10^5$) consist chiefly of losses associated with the development of a boundary layer near the wall in the interblade channel of the compressor cascade, while losses due to the vortex couple can be disregarded for practical purposes.

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YEMIN, O. N., YERMOLINA, N. P. and SAVVIN, D. S.

EXPERIMENTAL INVESTIGATION OF THE CHARACTERISTICS OF A REACTIVE TURBINE WITH
RELATIVELY LONG BLADES AND A ROTATING GUIDE VANE ASSEMBLY

[TRUDY] MOSKOVSKOGO AVIATSIONNOGO INSTITUTA [(Works) of Moscow Aviation Institute] in Russian No 329, 1975 pp 57-60

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B1013 by
A. S. Malyutin]

[Text] In order to investigate behavior of turbine parameters on the right-hand branch of the characteristics, in particular with rotation of guide vanes, experiments were done over a wide range of operating conditions from start-up to no-load turbine operation with relatively long ($D_{av}/h = 5.0$) vanes contoured in accordance with the law $\alpha_1 = \text{const}$. The starting characteristics of the turbine are given, showing that the turbine wheel may be blocked even in this regime. The starting characteristics and no-load characteristics are used to find the turbine characteristics over the whole range of rpm's. It is noted that there is an anomaly in flowrate variation with respect to rpm which is attributed to separation effects in the wheel channels at low

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USSR

YEMIN, O. N., YERMOLINA, N. P. and SAVVIN, D. S., TRUDY MOSKOVSKOGO AVIATSIONNOGO INSTITUTA, No 329, 1975 pp 57-60

rpm. A universal characteristic is plotted for turbine efficiency as a function of the effective angle of exit of the flow from the guide vane assembly, showing extensive possibilities for regulation of the last stages in a multistage turbine.

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USSR

GUREVICH, Z. R.

ON ERRORS IN PROFILING BLADES OF AN AXIAL COMPRESSOR BY THE METHOD
OF PLANE CROSS SECTIONS

Kuybyshev TR KUYBYSHEV AVIATS IN-TA [Works of Kuybyshev Aviation
Institute] in Russian, No 67, 1974 pp 75-84

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B1008]

[Text] The author gives an analysis of assumptions contained in the method of profiling blades of an axial compressor over plane cross sections. He gives an analytical expression for the error of the structural angles of the profiles obtained in the cross sections of the blades by the current surfaces. He determines the region of application of the method of plane cross sections in the original form and establishes ways for improving it. Authors's abstract.

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USSR

STEN'KIN, YE. D.

PRINCIPLE AND FEATURES OF THE OPERATION OF A FLOATING INPUT GUIDE
APPARATUS

Kuybyshev TR KUYBYSHEV AVIATS IN-TA [Works of Kuybyshev Aviation
Institute] in Russian, No 67, 1974 pp 85-94

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B1014]

[Text] The author suggests establishing a floating input guide apparatus at the input to the first stage of the compressor instead of the familiar input guide apparatus. He examines the diagram for the mutual arrangement of the profiles along the height of the blade of the suggested apparatus. He obtains relationships for determining the change in twisting of the current along the height of the blade and also the relationships for determining the rate of rotation of the apparatus in uncomputed regimes. He gives examples of the computation. The materials for analysis may be used in engineering practice. Author's abstract.

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USSR

UDC: 621.165.533.6

SHUSTER, A. R., Central Boiler and Turbine Institute

DESIGN OF TRANSSONIC AND SUPERSONIC GAS STREAMS IN THE FLAT GRIDS OF TURBINE MACHINES

Moscow TEPLOENERGETIKA in Russian, No 3, Mar 76, pp. 41-43

[Abstract] The problem mentioned in the title is solved by the method of adjustment. The complex edge problem for an elliptical-hyperbolic system with two independent variables is thus reduced to an initial-edge problem for a hyperbolic system of three independent variables. In order to perform the method, a finite-difference system is written which approximates the system of equations of unstable flow. Due to the stability of the edge conditions, it can be expected that the solution with time will converge on the desired stable solution.

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USSR

UDC 533.697

MITROFANOV, A. A.

A METHOD OF CALCULATING LOSSES IN FLAT COMPRESSOR CASCADES AT DIFFERENT REYNOLDS NUMBERS IN THE RANGE $(0.25-2.5) \cdot 10^5$

[TRUDY] MOSKOVSKOGO AVIATIONNOGO INSTITUTA [(Works) of Moscow Aviation Institute] in Russian No 329, 1975 pp 3-11

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B942 by T. S. Solomakhova]

[Text] The author suggests using empirical relations and graphs found by testing a series of straight compressor cascades with vanes having different bending angles of their midlines at different Reynolds numbers to determine the nature (detached or undetached) of flow around the vanes in compressor cascades, and to calculate approximate pressure losses.

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UVAROV, V. V., SHKURIKHIN, I. B. and MOLYAKOV, V. D., Moscow Higher Technical School imeni N. E. Bauman

STUDY OF THE JOINT OPERATION OF THE STAGES OF A TURBINE AND A RADIAL-CIRCULAR DIFFUSOR WITH CONTROLLED BOUNDARY LAYER

Moscow TEPLOENERGETIKA in Russian, No 5, May 76, pp. 18-20

[Abstract] Results are presented from an investigation of the joint operation of a single-stage turbine and a small radial-circular diffuser, with injection of a circular jet of air around the outer rim of the diffuser. The operation of the turbine-diffuser sector is studied using an is diagram on the assumption that the available temperature drop over the section, as well as the blade efficiency always remain unchanged. The results confirm the possibility of effective utilization of small radial-circular diffusers with injection operating jointly with a turbine stage.

USSR

IN'KOV, A. P., STAT'YEV, A. A., UTKIN, V. N., FILIN, N. V. and YARKHO, S. A.

INVESTIGATION OF IRREGULARITY IN THE DISPERSE REGIME OF HYDROGEN FILM BOILING IN PIPES

Moscow VOPR SOVREM KRIOGENIKI [Questions of Contemporary Cryogenics, Collection of Works] in Russian, Izd-vo Vneshtorgizdat, 1975 pp 231-238

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B519 by A. A. Ivashkevich]

[Text] The authors made a theoretical and experimental investigation of the heat exchange during film boiling of hydrogen in a pipe (disperse regime). In the heat-exchange model it was assumed that the thermal flux from the pipe wall is carried away by steam and then part of it goes into evaporation of the liquid. A two-phase flow is examined as thermally unbalanced. A system of 29 equations was solved numerically on a computer under various assumptions. The tests were conducted for a flow of liquid hydrogen

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USSR

IN'KOV, A.P., STAT'YEV, A. A., UTKIN, V. N., FILIN, N. V. and YARKHO, S. A., VOPR SOVREM KRIOGENIKI, 1975 pp 231-238 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B519]

in pipes with a diameter of 10.4 mm, a length of 1.6 and 2 m at a pressure of 1.45-8.03 bar. The hydrogen flow rate was $(0.16-2.7) \cdot 10^{-3}$ kg/sec, the thermal flux was 1-89 kW/m² (ohmic heating), wall temperature of 60-250° K. The authors measured the wall temperature and the pressure along the length of the pipe, and also the vapor content of the flow and the temperature of the vapor at the output of the pipe. They detected a substantial thermal irregularity in the flow: the ratio of the balanced vapor content to the actual was 3.5-7.5, the vapor temperature surpassed the saturation temperature by 10-240° K. The computed values of the true vapor content and the true temperature of the vapor were compared with the experimental values. This comparison permitted verifying the assumptions made in the computations and selecting the most justified ones. References 7.

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USSR

YARKHO, S. A.

DISPERSE REGIME OF FILM BOILING OF CRYOGENIC LIQUIDS IN PIPES

Moscow VOPR SOVREM KRIOGENIKI [Questions of Contemporary Cryogenics] in Russian, Izd-vo Vneshtorgizdat, 1975 pp 217-231

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B518 by Yu. Ye. Pokhvalov]

[Text] On the basis of the results obtained by various investigators, the author analyzes the mechanism of the process and the intensity of heat yield during film boiling of cryogenic liquids in pipes and defines the problems for future investigations. He examines the drop (disperse) regime of the flow of liquid without a film on the surface of heat exchange. The physical model of this process based on the concept of removal of heat from the wall only by superheated steam but with a higher degree of turbulence is assumed to be more justified. The author mentions that the computed suggested recommendations for nitrogen on the strength of the

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USSR

YARKHO, S. A., VOPR SOVREM KRIOGENIKI, 1975 pp 217-231 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B518]

simplifying suggestions require checking in the event of their utilization for other cryogenic liquids. There are no data in the literature concerning the conditions for onset of the disperse regime of film boiling nor on the hydraulic resistance for cryogenic liquids. The author examines the methods of investigating the parameters of the disperse flow and mentions the important significance of their refinement for developing a process of analysis and computation of the hydraulic resistance and intensity of heat yield. He specially emphasizes the importance of compiling experimental data on these questions during disperse flow on segments with local resistance and for large mass velocities in long conduits. References 19.

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VOLYNETS, A. Z., SAFONOV, V. K., YEVTUGIN, A. G.

PRINCIPLES OF THE DESIGN OF DESUBLIMATORS OF CONTINUOUS-OPERATION SUBLIMATION
INSTALLATIONS

Moscow KHOLODIL'NAYA TEKHNKA in Russian, No 4, Apr 76, pp. 36-39

[Abstract] A classification is suggested for methods of the design of vacuum desublimators (devices intended to condense water vapor by freezing onto various cooled surfaces). A method is given for design of desublimators for continuous sublimation drying installations (constant vapor flow) operating with periodic and continuous removal of the desublimates.

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EQUIPMENT
Aeronautical & Space

USSR

UDC 629.78:621.38

UNSIGNED

THE ELECTRONICS OF FLIGHT VEHICLES

RADIOELEKTRONIKA LETATEL'NYKH APPARATOV, A THEMATIC COLLECTION OF SCIENTIFIC WORKS, No. 7, Khar'kov Aviation Institute, 1975, 162 pp

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No. 3.41.249K from the resume]

[Text] This collection presents materials from theoretical and experimental studies in the area of electronics, computer equipment and automated control systems. Studies are made of methods of determining the basic parameters of relaxation oscillations in a nonlinear circuit, an optical-mechanical scanning device is developed, the statistical characteristics of the components of hybrid integrated circuits are studied. Works are presented dedicated to problems of multicriterion optimization of a production union with an automated management system, prediction of the stability of parameters of functional units in discrete systems, methods of checking the parameters

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USSR

UNSIGNED, RADIOELEKTRONIKA LETATEL'NYKH APPARATOV, A THEMATIC COLLECTION OF SCIENTIFIC WORKS, No. 7, Khar'kov Aviation Institute, 1975, 162 pp

of linear dynamic systems, methods of calculation of the effectiveness of the making of complex decisions in control systems. A study is made of the passage of the elastic oscillations through a multilayer medium, the distribution and spectral density of the level and phase of a signal propagating in the troposphere are studied. Works are presented on optimization of real-time computer systems, and methods are suggested for increasing the effectiveness of computer systems by deparallelizing and the use of tabular methods for performance of operations. It is noted that the materials of the collection are of interest for scientific research institute engineering and technical workers, design bureaus and plants.

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USSR

KNYSH, YU. A., LUKACHEV, S. V.

INVESTIGATION OF A MODEL OF CYCLONE AIR PURIFYING DEVICE WITH SATELLITE AXIAL FLOW

Kuybyshev TR KUYBYSHEV AVIATS IN-TA [Works of Kuybyshev Aviation Institute] in Russian, No 67, 1974 pp 208-211

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3B1001]

[Text] The authors give the results of an investigation on a single-flow cyclone filter with satellite axial flow. They demonstrate that along with increased throughput such a cyclone possesses good effectiveness of dust removal. They give recommendations on selecting the geometric elements of the cyclone. Authors' abstract.

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USSR

UDC 621-555:621.1(088.8)

NOSACH, A. YA.

COMPENSATOR OF THE DIFFERENCE IN LINEAR EXPANSIONS OF PARTS TO BE JOINED

AVT SV SSSR [USSR Patent] in Russian, kl F 16 b 2/18 F 12 b 7/00, No 407096, announced 7 Aug 69, published 21 Nov 73

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8 1975 Abstract No 8,34,61P]

[Text] For joining parts found in different thermal states with provision for their centering without stresses due to the difference in heat expansions, the author suggests the use of an eccentric joint with the aid of an axis having an eccentric cam and cylindrical pins as the compensator of the difference in linear expansions of parts to be joined. Figures 2. Author's abstract.

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Gyroscopic

USSR

GANIYEV, R. F. and MAKARENKO, A. I.

ON AN INVESTIGATION OF SPATIAL MOVEMENTS OF A SOLID BODY WITH A CONTROL GYROSCOPE UNDER CONDITIONS OF RESONANCES

Ivanovo VOPR MAT FIZ I TEORII KOLEBANIY, VYP 3 [Questions in Mathematical Physics and the Theory of Oscillations, No 3, Collection of Works] in Russian, 1975 pp 19-26

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3A63 by I. V. Novozhilov]

[Text] The authors examine a mechanical system consisting of a satellite and a gyroscope installed on it in an inertialess universal joint. The centers of masses of both bodies coincide. The authors investigate the angular motions of the system relative to the common center of masses moving in circular orbit. Moments of gravitational forces act on both bodies, moments of forces of viscous friction are applied to the satellite which are proportional

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USSR

GANIYEV, R. F. and MAKARENKO, A. I., VOPR MAT FIZ I TEORII KOLEBANIY, VYP 3, 1975 pp 19-26 [From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3A63]

to the rates of change of its Euler angles relative to the orbital reference system, moments of forces of viscous friction act along the axes of the gyroscope joint. The gyroscope is enveloped by a chain of interframe correction, the characteristic of the moment sensor is a relay one with zone insensitivity.

The authors give equations with an accuracy up to terms of the third order of smallness by angle. The system is investigated with the aid of the method of averaging. The generating system of equations is obtained by discarding terms with friction and terms above the first order of smallness by angle. Resonance cases are investigated which correspond to multiple relationships of the roots of the generating system. The authors seek stationary regimes and investigate their stability.

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USSR

UDC 62-50

IZVOL'SKIY, YE.G., KUZIN, V.P., and TABACHNYY, YE.M.

OPTIMUM HIGH-SPEED CONTROL OF A QUASISTATIONARY OBJECT

Moscow TRUDY MOSKOVSKOGO AVIATIONNOGO INSTITUTA [Works of the Moscow Aviation Institute] in Russian No 330 1975 pp 15-21

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5A71 by N.Ye. Stavrakova]

[Text] This is a continuation of the authors' work (see Kuzin, V.P., and Tabachnyy, Ye.M., same publication, No 308, 1974, pp 69-74, and Referativnyy Zhurnal -- Mekhanika, No 7, 1975, Abstract No 7A211), in which they solve the problem of formulating the optimum (or close to optimum) control of an object having parameters that change as the operating conditions do. For systems with a linear part consisting of an integrating and an inertial component, as well as two inertial and integrating components, they formulate optimum switching laws that are independent of changes in the time constant and the object's transfer constant.

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USSR

UDC 62-50

KREMENTULO, V.V.

ON THE OPTIMUM STABILIZATION OF A SOLID WITH THE HELP OF A CONTROLLABLE GYROSCOPE

SBORNIK NAUCHNO-METODICHESKIKH STATEY PO TEORII MEKHANIKI. MINISTER-VYSSHOGO I SREDNEGO SPETSIAL'NOGO OBRAZOVANIYA SSSR [Collection of Scientific and Methodological Articles on the Theory of Mechanics; USSR Ministry of Higher and Secondary Specialized Education] in Russian No 5 1975 pp 38-44

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 5, May 76 Abstract No 5A72 (resume)]

[Text] Within the framework of analytical control theory, the author gives a solution for the problem of optimum (in a specific sense) stabilization of the equilibrium position of a solid with the help of a controllable gyroscope mounted at an arbitrary point in the body. Control is derived in the form of functions of the phase coordinates of the body being stabilized, which insures the asymptotic stability of the body's given equilibrium position and provides the minimum of some function of an integral type. References 8.

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KARPOV, V. K.

FORCED OSCILLATIONS OF A GYROSTABILIZER WITH NONLINEAR CHARACTERISTIC OF THE CORRECTION LOOP

Tula STABILIZATSIYA I ORIENTIROVANIYE AKTINOMETRICHESKOY APPARATURY PRI PROVEDENII NABLYUDENIY S PODVIZHNYKH OB"YEKTOV [Stabilization and Orientation of Actinometric Equipment when Making Observations from Moving Vehicles, Collection of Works] in Russian No 3, Part 2, 1974 pp 16-24

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4A73 by the author]

[Text] The paper gives the principal results of a study of forced oscillations of a single-axis gyrostabilizer with nonlinear characteristic of the pendulum type vertical sensor.

Analytical relations are found for calculating forced oscillations of a nonlinear gyrostabilizer. An investigation is made of the influence that the parameters of the correction loop of the gyrostabilizer and the parameters of roll of the base have on the amplitude of forced oscillations of the gyro frame. Practical recommendations are made on choosing the principal elements

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USSR

KARPOV, V. K., STABILIZATSIYA I ORIENTIROVANIYE AKTINOMETRICHESKOY APPARATURY PRI PROVEDENII NABLYUDENIY S PODVIZHNYKH OB"YEKTOV, No 3, Part 2, 1974 pp 16-24

and parameters of the correction loop for gyrostabilizers with vertical sensors that respond to acceleration of the base. References 5.

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USSR

UDC 629.78:621.396.67

ZAYCHENKO, K. V., KALYUZHNYI, V. P.

ESTIMATION OF ERRORS OF THE COMPUTER IN A GYROSCOPIC STABILIZATION
SYSTEM FOR A PHASED ANTENNA ARRAY ON A MOVING PLATFORM

TR LENINGR IN-T AVIATS PRIBOROSTR in Russian 1975, No. 95 pp 28-30

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No.
3.41.271 from the resume]

[Text] Expressions are found for evaluation of the methodological and
computational errors of a digital computer, using signals from gyro-
scopic transducers to stabilize the angular position of the beam of
a phased antenna array located on a moving platform. 4 references.

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USSR

UDC 629.78.017.2

AKHMETSHIN, A. KH.

SOME STABLE MOTIONS OF A SATELLITE WITH A GYROSCOPE

TR KAZAN AVIATS IN-TA in Russian 1975, No. 184 pp 9-14

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3 1976, Abstract No.
3.41.100 from the resume]

[Text] A study is made of the limited problem of motion of mechanical
systems (MS) consisting of a solid body (the body of the MS) carrying
a gyroscope in a cardan support in a Newtonian central field of forces.
The forces of partial dissipation, which may be balanced, and elastic
forces are considered. The concepts of the first and third adjusted
forces are considered. The concepts of the first and third adjusted
MS are introduced. Sufficient conditions are produced for asymptotic
stability of the stable motion generated. 4 figures; 5 references.

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USSR

AKHMETSHIN, A. KH.

SEVERAL STATIONARY MOVEMENTS OF A SATELLITE WITH A GYROSCOPE

Kazan' TR KAZAN AVIATS IN-TA [Works of Kazan' Aviation Institute]
in Russian, No 184, 1975 pp 9-14

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3A75]

[Text] The author examines the bounded problem of movement of a mechanical system (satellite) consisting of a solid body (hull of the satellite) and a gyroscope installed on it in a universal joint in a Newtonian central field of forces. He takes into account the forces of partial dissipation which may be balanced and the elastic forces. He introduces the concepts of first and third reduced satellites. He obtains the sufficient conditions of asymptotic stability of the selected stationary movements. References 5. Author's abstract.

1/1

USSR

SOMOV, YE. I. and FATKHULLIN, E. F.

OPTIMAL CONTROL OF A GYROSTAT IN PROGRAMMED MOVEMENT

Kazan' TR KAZAN AVIATS IN-TA [Works of Kazan' Aviation Institute]
in Russian, No 180, 1975 pp 37-40

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 3 1976 Abstract No 3A79]

[Text] The authors solve the problem of a stable accomplishment of assigned programmed angular movement of a gyrostat (a solid body with three flywheels) by allowing for the requirements of optimality in speed of response of damping of the initial deviations from the program, autonomy of the channels and limitations in the second derivative of the perturbed coordinates. References 8. Authors' abstract.

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TOKAREV, V. I.

A SYSTEM FOR REMOTE COUPLING OF A POWER PITCH GYRO AND GYROSTABILIZER

Tula STABILIZATSIYA I ORIENTIROVANIYE AKTINOMETRICHESKOY APPARATURY PRI PROVEDENII NABLYUDENIY S PODVIZHNYKH OB"YEKTOV [Stabilization and Orientation of Actinometric Equipment when Making Observations from Moving Vehicles, Collection of Works] in Russian No 3, Part 1, 1974 pp 88-102

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4A69 by the author]

[Text] An analysis is made of the electrokinematic system of a power pitch gyro and differential equations of motion are derived for a platform having remote coupling to a two-axis gyrostabilizer.

An examination is made of the case where a power pitch gyro is installed on a rolling vehicle (ship), and an analysis is done on forced oscillations of the platform and instrument when transfer functions of the system are used by isolating the moduli and arguments of expressions for the amplitude-phase frequency response of the system.

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ROGOV, S. V. and NEMTSOV, L. D.

ON THE ACCURACY OF STABILIZERS OF GYROPENDULUM TYPE FOR VEHICLE ROLL

Tula STABILIZATSIYA I ORIENTIROVANIYE AKTINOMETRICHESKOY APPARATURY PRI PROVEDENII NABLYUDENIY S PODVIZHNYKH OB"YEKTOV [Stabilization and Orientation of Actinometric Equipment when Making Observations from Moving Vehicles, Collection of Works] in Russian No 3, Part 1, 1974 pp 81-87

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4A70 by the authors]

[Text] Vertical and horizontal accelerations act on the displaced center of a gyropendulum stabilizer in orbital motion of a ship. Under these conditions the so-called effect of "zero displacement" arises, which can be analytically determined by solution of initial equations with accuracy to the second approximation.

The above-mentioned studies are done in this article, and finite relations are found for the error of the device.

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KARNAKOV, V. V. and MYNBAYEV, D. K.

INFLUENCE THAT ERRORS OF A LASER GYROSCOPE HAVE ON THE ACCURACY OF DETERMINING THE ANGULAR POSITION OF AN OBJECT

IZVESTIYA LENINGRADSKOGO ELEKTROTEKHNICHESKOGO INSTITUTA [News of Leningrad Electrical Engineering Institute] in Russian No 175, 1975 pp 63-65

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4A82 by the authors]

[Text] An expression is derived for the effect of laser gyroscope error on the accuracy of determining the angular position of an object. This expression relates errors of the laser gyroscope to errors in calculation of the accuracy of the matrix of direction cosines. The selected criterion for accuracy of determination of the angular position of an object may be used in choosing the optimum parameters of a laser gyroscope.

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USSR

UDC 662.997:537.22

UMAROV, G. YA., ALIMOV, A. K. and ALAVUTDINOV, DZH. N., Physico-Technical Institute of the Uzbek SSR Academy of Sciences imeni S. V. Starodubtsev

CASSEGRAIN SYSTEM FOR SOLAR ENERGY

Tashkent GELIOTEKHNIKA in Russian No 2, 1976 pp 68-69 manuscript received 20 Feb 74

[Abstract] The authors have developed and assembled a heliotechnical device consisting of a projector paraboloid and a convex hyperbolic mirror. With a 1.5 meter diameter of the paraboloid the heat output of the device reaches 1 kW with a solar radiation of about 800 W/m². The authors recommend for high-temperature investigations devices of the Cassegrain system of hyperboloid glass reflecters with a ratio of the auxiliary and main mirror diameters of about 0.35. Figures 2; references 3: 3 Russian.

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USSR

UDC 662.997+62-229.31

BASHNYAK, A. YA., MAVASHEV, YU. Z., NECHAYEVA, L. V. and RUDSHTEYN, V. L., Institute of Electronics of the Uzbek SSR Academy of Sciences

AUTOMATIC COORDINATE BENCH FOR A SOLAR FURNACE

Tashkent GELIOTEKHNIKA in Russian No 2, 1976 pp 62-64 manuscript received 20 Mar 75

[Abstract] The authors describe the design of an automatic bench for a solar furnace which ensures movement of the images placed into focus in three mutually perpendicular directions. The control panel is placed outside the range of the zone of the solar furnace to be illuminated. The test models may be placed into a chamber in which a vacuum or gas atmosphere is created. The authors list the possible spheres of application of the described attachment. Figures 3.

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USSR

UDC 831.715.27(088.8)

SEREGIN, A. G.

BUILDING SLIP SIGHTING DEVICE IG96

Moscow IZMERITEL'NAYA TEKHNIKA in Russian No 2, Feb 76 pp 56-57

[Abstract] The IG96 building slip sighting device is used for a variety of purposes in ship building including the monitoring of the mutual positions of the surfaces of parts and components of large-scale products. The author describes the operating principle of the device. Use of this instrument permits a substantial increase in the accuracy of operations involved and a reduction in time for the process of building the hull of the ship at the building slip. Figure 1; references 2: 2 Russian.

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USSR

UDC 629.123.4

PANKOV, V. A., ZHURAVEL', YE. A.

THE "NORIL'SK" CLASS OF UNIVERSAL BULK CARGO SHIPS

Moscow SUDOSTROYENIYE in Russian No. 4, Apr 76 pp 5-9

[Abstract] The "Noril'sk" class of ships, the first one of which, the Kapitan Panfilov, was constructed at the Kherson Shipbuilding Plant in 1975, will be used to satisfy the increasing demands for bulk cargo transport on the Murmansk-Arkhangelsk-Dudinka line. The ship will carry containers to Dudinka, ore and empty containers in the reverse direction, greatly increasing the economic indicators of operation of the ship. The basic element of the design of the ship are: overall length 145.4 m, beam at 20.6 m, draft 9.42 m, displacement 20,160 t, container capacity 345, hold capacity 16,960 cubic meters, main engine power 6700 hp, speed fully loaded 14 knots, cruise range 6000/10,000 miles. General drawings and deck plans are presented.

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USSR

UNSIGNED

THE SIGN OF QUALITY IS AWARDED TO A VARIABLE-PITCH SCREW

Moscow SUDOSTROYENIYE in Russian No. 5, May 76 pp 32

[Abstract] The State Committee on Standards of the Council of Ministers USSR has awarded the State Sign of Quality and issued a Certificate of Registration of a product awarded the State Sign of Quality for the VR 503 variable-pitch screw. This screw can transmit 1320 hp, design operating speed 250 rpm, diameter 2.15 m, pitch ratio 0.9, disc ratio 0.57, full range of rotation of blades 60°, time of rotation of blades from full forward to full reverse position not over 30 seconds, blade drive fluid pressure not over 40 kg/cm², operating life to overhaul 30,000 hours, operating life in all 80,000 hours, service life 20 years.

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USSR

UDC 621.56:629.124.72

IONOV, A. G., Kaliningrad Technical Institute of the Fish Industry, KAN, A. V., Ministry of the Fishing Industry, PETROV, V. M., Sudoimport, KLEIDERMAN, R., LOSSE, K., HELLERT, B., PUSCH, A., Kuhlautomat Enterprise, Berlin

COMMERCIAL TESTING OF A LOW-TEMPERATURE ROTARY FREEZER WITH MULTISTAGE COOLING INSTALLATION

Moscow KHOLODIL'NAYA TEKHNIKA in Russian, No 5, 1976, pp. 10-12

[Abstract] The fishing trawler Khronometr has carried a type FGP-31.5-3 rotary freezer with multistage cooling installation since February of 1975 as a test. The purpose of the test is to determine the efficiency, reliability and productivity of this refrigeration unit freezing commercial fish, to determine the heat engineering, operational and technical-economic characteristics of the equipment. The tests have been performed primarily in the moderate latitude with air temperatures of 18-25 C, sea temperatures of 18-22 C. During the testing, a number of structural shortcomings have been located, which are to be eliminated by refinement of the rotary refrigeration unit. The loading device and rotor should be located on a common foundation frame, since low temperature operation at sea may result in shifting of the load relative to the space between plates of the rotor. The strength of the cassettes must also be increased, since their walls must

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USSR

IONOV, A. G., KAN, A. V., PETROV, V. M., KLEIDERMAN, R., LOSSE, K., HELLERT, B., PUSCH, A., Moscow KHOLODIL'NAYA TEKHNIKA, No 5, 1976, pp. 10-12

withstand significant forces due to the increase in the volume of the fish as they freeze. Freon-13 leakages during the period of operation have amounted to about 300 kg (about 20%), primarily due to failure of parts, leakage of freon-22 -- 24 kg (10%). The glands have provided good sealing.

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USSR

UDC 629.78.018.4

BOZHKO, A. YE., SAVCHENKO, V. I., IL'IN, V. M.

SYSTEM FOR TESTING OBJECTS FOR RANDOM DYNAMIC LOADS

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 Khar'kov in Russian p 54

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3 1976, Abstract No. 3.41.191 from the resume]

[Text] The Institute of Problems of Machine Building, Academy of Sciences, UkSSR, has developed a system for controlling a vibrating test installation allowing the accuracy of reproduction of random dynamic loads and conditions of stable operation of the system to be improved by eliminating phase distortions introduced by the control device and the object of control. The system includes a programming device, system for controlling the vibration stand, feedback circuit with controlled phase-shifter circuit and phase adjustment device. The adjustment device consists of two rectangular signal shapers, one of which is connected to the programming device, the other -- through

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USSR

BOZHKO, A. YE., SAVCHENKO, V. I., IL'IN, V. M., VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI LETATEL'N APPARATOV 1975 TEZISY DOKL 1975 Khar'kov p 54

a matching amplifier to a vibration sensor installed on the object being tested. The outputs of the shapers are connected through the phase switch and mean value filter to the phase shifting circuit. The output signal of the phase switch carries information on the phase shift between the signals of the programmer and the vibration sensor signal. The filter forms a voltage proportional to this phase shift, which is fed to the phase shifter circuit, connected into the feedback circuit. The phase of the feedback signal sent to the comparison element of the vibration stand control circuit is adjusted. The introduction of the phase adjustment device to the system significantly increases the accuracy of reproduction of vibration effect, improving the conditions of stable operation of the test stand.

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USSR

UDC 532.57+532.137+536.51+532.14.08+531.787

YERSHOVA, T. A., KULESH, V. P., ORLOV, A. A. and KHARCHENKO, V. N.

INVESTIGATION OF SUPERSONIC TURBULENT FLOWS BY LASER INTERFEROMETER

Novosibirsk PRISTENNOYE TURBULENTNOYE TECHENIYE [Turbulent Flow Near a Wall, Collection of Works] in Russian Part 2, 1975 pp 118-126

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 4, 1976 Abstract No 4B1043 by G. L. Grodzovskiy]

[Text] A description is given of the procedure and results of an experimental study of velocity profiles in a turbulent boundary layer and in the region of separation on a cylinder in a longitudinal flow at a Mach number $M_\infty = 5$. The density profiles were measured by laser interferometer, while the profiles of pressures and stagnation temperature were measured by Pitot tubes. The density fields were studied by a laser interferometer with narrow comparison beam. The interferometer was made with an autocollimation optical system. The illuminator was a Q-switched ruby pulse laser with pulse duration of $3 \cdot 10^{-8}$ s, and light energy in a pulse of 0.1 J. In order to determine the instantaneous distribution of density in the axisymmetric boundary layer of the cylinder from the interference patterns, the corresponding system of

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USSR

YERSHOVA, T. A., KULESH, V. P., ORLOV, A. A., and KHARCHENKO, V. N., PRISTENNOYE TURBULENTNOYE TECHENIYE, Part 2, 1975 pp 118-126

Abel equations was solved on a computer. The accuracy of the density measurements was approximately 4% of the maximum value. Typical curves are given for the distribution of density in the boundary layer of the cylinder and in the region of separation of the boundary layer in the zone of interaction with the compression shock.

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USSR

UDC 629.78.018.4

GONCHARENKO, V. I., SHUSHAKOV, M. A., YASYUKEVICH, S. M.

MULTIPOINT SYSTEM FOR MEASUREMENT OF LOADS IN STRENGTH TESTING

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI
LETATEL'N APPARATOV 1975 TEZISY DOKL in Russian Khar'kov 1975, pp 47-48

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No.
4.41.167 by S. G. Z.]

[Text] A model is developed and studied for a system for automatic collection of information on loads acting on a structure. The system can operate independently or as a part of an overall information-measurement complex including a digital computer. In designing the system, a plan providing for the production of accuracy of no worse than that currently achieved (+2%), with maximum utilization of series-produced apparatus, flexibility of control and minimum risk of information loss was considered best. The force meter used consists of electric-rod dynamometers (D). The D measure loads, record them on a strip chart and convert them to electric signals with voltages of

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USSR

GONCHARENKO, V. I., SHUSHAKOV, M. A., YASYUKEVICH, S. M., VSES KONF
AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI
LETATEL'N APPARATOV 1975 TEZISY DOKL Khar'kov 1975, pp 47-48

0-10 v. A control and commutation device is used to commutate the signals at the input of the analog-digital converter and to control the entire system. The input of coded information to the computer for output to a type PL-150 puncher is controlled by a matching device. Experimental operation of the system leads to the following conclusions: the system can perform measurements with continually changing loads and leave the primary document in the form of a recording on a strip chart. Control flexibility allows timely retuning of the system from one mode to another.

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ZELENTSOV, V. I., SULAKSHIN, A. S. and FEDOROV, N. P., Scientific Research Institute for Nuclear Physics, Electronics and Automation of Tomsk Polytechnical Institute

A DEVICE FOR MEASURING THE CARRIER FREQUENCY OF INDIVIDUAL SUPERHIGHFREQUENCY PULSES

Moscow PRIBORY I TEKHNICA EKSPERIMENTA in Russian, No 2, Mar-Apr 76, pp. 132-133 manuscript received 6 June 75

[Abstract] The frequency meter is described, based on the measurement of the flight time of a radio pulse over a dispersion transmission line. The range of measurement is 2.1-4.1 GHz. Measurement accuracy is no worse than $5 \cdot 10^{-5}$. The SHF pulse, the amplitude of which is regulated by a variable attenuator, passes through the dispersion system. The time required for the pulse to pass through the dispersion line is measured by a time-amplitude converter and output to a pulse amplitude analyzer. Pulses in the start and stop channels of the time-amplitude converter are formed directly by detection of the SHF signals at wideband detectors of the input and output of the dispersion line.

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LAZAREV, V. B. and TISHCHENKO, E. A., Institute of Physical Problems, Academy of Sciences USSR, Moscow

AN INSTALLATION FOR POLARIZATION MEASUREMENT IN THE SUBMILLIMETER RANGE

Moscow PRIBORY I TEKHNICA EKSPERIMENTA in Russian, No 2, Mar-Apr 76, pp. 135-136 manuscript received 26 June 1975

[Abstract] A quasioptical installation is described for rapid and simultaneous measurement in two mutually perpendicular polarizations of the effective cross sections and angular scattering diagrams of microwave beams in the range of wavelengths of 0.3 to 1 mm. One peculiarity of the method consists in the use of a high speed mechanical polarization modulator. The accuracy of measurements in the slow mode is higher than in the fast mode, since the signal is integrated over a much greater period of rotation of the modulator disc; however, in this mode the long-term instability of the power supply is manifested more strongly, so that the plane of polarization of radiation "floats" slightly. The actual achievable accuracy is therefore 3-5% with a power supply stability of 10^{-4} (as to voltage).

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SOROKIN, O. M.

A PLAN FOR AUTOMATIC RECORDING OF THE AMPLITUDE DISTRIBUTION OF THE PULSES IN A PHOTOMULTIPLIER WITH EXCLUSION OF THE DARK CURRENT

Moscow PRIBORY I TEKHNIKA EKSPERIMENTA in Russian, No 2, Mar-Apr 76, pp. 155-159 manuscript received 15 July 1975

[Abstract] A plan is suggested for automatic measurement and recording of the amplitude distribution of the output pulses of a photomultiplier excited by light, allowing the dark current to be excluded. The system contains a differential amplitude pulse analyzer with scanning, two counting channels to which the pulses of the dark current and the pulses of the illuminated photomultiplier are alternately connected, a control unit for synchronized switching of "frames" and regulation of the channel load, a flash light source and a differential voltmeter based on an integrated microcircuit. The system is used to study the amplitude distribution of light pulses of the photomultiplier with various supply voltages and gains in the recording system. The system combines the advantages of the mode of counting individual photoelectrons and modulation techniques of separation of the light signal.

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BELOKRINITSKIY, N. S., BEREZA, V. N., BOBKOV, B. D. and KERNAZHITSKIY, L. A.,
Institute of Physics Academy of Sciences UkSSR, Kiev

DETERMINATION OF THE VELOCITY OF SHOCK WAVES BY THE LASER METHOD

Moscow PRIBORY I TEKHNIKA EKSPERIMENTA in Russian, No 2, Mar-Apr 76, pp. 181-182 manuscript received 29 April 75

[Abstract] A laser schlieren method is described, used to measure the velocity of intensive shock waves in Ar and O₂. The time resolution of the system is determined only by the width of the laser beam and the transmission band of the electric circuit and is 0.7 μ s for a velocity of 3 km/s. Recently the velocity of a shock wave in Ar was measured with an initial pressure of 2.2 torr as $v = 0.785$ km/s. The authors used the same method of measure the velocity of a shock wave in Ar and O₂ at even higher initial pressures and shock intensities. The shock tube consists of a high pressure chamber 55 cm in length and a lower pressure chamber 7.5 m in length and 81 mm in diameter, made of stainless steel.

ARTEMOV, V. M., ZHELKOBAYEV, Zh., KALENDIN, V. V., KUKHTEVICH, V. I.,
MUKHTAROV, R. I. and PRYGUNOV, V. I., All-Union Scientific Research Institute
for Optical-Physical Measurements

A COMPENSATION INFRARED BAND PHASE METER

Moscow PRIBORY I TEKHNIKA EKSPERIMENTA in Russian, No 2, Mar-Apr 76, pp.
188-191 manuscript received 15 August 75

[Abstract] An infrared band (9-11 μm) phase meter is described, based on a Mach-zender interferometer using the modulation-compensation method of measurement of the phase of the coherent optical radiation. A method is presented for calibration of the instrument, designed for measurement of constant (in the 0-2 πN range) and slowly change ($\pm 20^\circ/\text{sec}$) phase shifts with an error of about 1° of phase.

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BOGDANOV, P. I., ZYKOV, P. G. and SUYETIN, P. Ye., Urals Polytechnical
Institute, Sverdlovsk

INSTALLATION FOR MEASUREMENT OF THE VELOCITY OF A STREAM OF GAS BY THE METHOD OF REPEATED ELECTRIC BREAKDOWN

Moscow PRIBORY I TEKHNIKA EKSPERIMENTA in Russian, No 2, Mar-Apr 76, pp.
195-197 manuscript received 14 June 75

[Abstract] A device is described allowing measurement of local velocities and their distribution along a discharge gap. These measurements can be performed in the direction of the stream or across the stream. The functional units of the installation are described and their parameters presented. The installation can measure gas stream velocities of 0.30-200 m/sec with an error of 3-10%. A schematic diagram of the installation is presented, as well as curves of velocities produced in air at various pulse repetition frequencies.

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USSR

UDC 629.78.018.3:681.3

ABAKSHINA, L. YE., IVANOV, A. V., PRISEKIN, V. L., RASSOKHIN, V. V.,
STYTSYUK, V. I.

CONTROLLING HOT STRENGTH TESTING BY MEANS OF THE DNEPR-2 CONTROL
COMPUTER

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI
LETATEL'N APPARATOV 1975 TEZISY DOKL Khar'kov 1975, in Russian pp 25-26

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3 1976, Abstract No.
3.41.203 by T. A. YE.]

[Text] A study is made of an automatic control system for heating and loading during hot-strength testing of flight vehicles. The programmer and regulating organ is a Dnepr-2 control computer, consisting of the Dnepr-21 computer and the Dnepr-22 control complex. The task of the control system is to perform time-regulated heating and loading programs for the tested object. The purpose of the investigation is to process testing methods and select a regulation rule allowing real-time, accurate realization of assigned programs in several different zones of loading and heating.

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USSR

UDC 629.78.018.3:681.3

VOLKOV, V. G., GRIGOR'YEV, S. L., SHMIDT, O. G.

COLLECTION AND PROCESSING OF SIGNALS FROM THERMOCOUPLES BY MEANS OF A
HIGH SPEED SYSTEM

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI
LETATEL'N APPARATOV 1975 TEZISY DOKL Khar'kov 1975, in Russian p 65

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 3, 1976 Abstract No.
3.41.204 from the resume]

[Text] A system is suggested for measurement, processing and preparation for transmission to a Mir computer of signals from thermocouples used to study the unstable temperature fields of gas streams and heat-stressed parts of various devices. The results of measurement are recorded using PL-150 puncher, achieving a speed of operation of 15 measurements per second with a sensitivity of $10\mu\text{V}$. When a BESM computer is used to process the data, the speed of the system can be significantly increased by reducing the punch tape necessary to record one measurement to three lines. In this case, the speed can be determined by the speed of measurement of the digital volt meter.

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GOLUBEV, A. V., DOLGIKH, M. A. and PRIGOZHIN, Ye. S., Scientific Research Institute of Foundations

A STABILOMETER WITH A FIXED LOADING MODE

Moscow OSNOVANIYA FUNDAMENTY I MEKHANIKA GRUNTOV in Russian, No 3, May 76, pp. 29-30

[Abstract] The Scientific Research Institute of Foundations has developed a new stabilometer, the SP-55, which can test soil specimens both in the mode of compression, and in the mode of constant lateral pressure. The axial loading of the specimen is automatic at an assigned load rise rate. The loading time can be varied over broad limits -- from 2 hr to 5 days. Lateral pressure on the specimen is created using a pneumohydraulic system allowing precise measurement of transverse deformations of the specimen. A photograph and diagram of the device are presented. The SP-55 stabilometer is to be series-produced.

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BATOVA, M. I., SHAPIRO, S. L., Moscow Electromechanical Plant imeni Vladimir Il'ich

AN INSTALLATION FOR MEASUREMENT OF MAGNETOSTRICTION AT ELEVATED TEMPERATURES

Moscow ZAVODSKAYA LABORATORIYA in Russian No. 3, 1976 pp 290-292
manuscript received 5 Feb 75

[Abstract] The authors have developed a device for measurement of magnetostriction at elevated temperatures, using a tensometric displacement sensor with mechanical gain as the remote sensor. The sensitivity of the device is increased by an order of magnitude, allowing standard tensometric apparatus to be used as the recording instrument. The temperature errors are correspondingly decreased. The device is simple to use and reliable in operation. Results are presented from the testing of nickel.

BOZHKO, A. YE., PUSHNYA, V. A.

OPTIMIZATION OF PARAMETERS OF A VIBRATION TEST STAND

VSES KONF AVTOMATIZ ISSLED NESUSHCHEY SPOSOBNOSTI I DLITEL'N PROCHNOSTI
LETATEL'N APPARATOV 1975 TEZISY DOKL in Russian Khar'kov 1975, p 56

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No. 4, 1976 Abstract No.
4.41.164 by A. V. U.]

[Text] A method is suggested for synthesis of the parameters of an electrodynamic vibration test stand based on the optimal dynamic characteristics. Synthesis is conducted by approximation of the optimal characteristics using a Gaussian quadrature formula or the method of least squares by interpolation of the dynamic characteristic with construction of an area of assigned placement of the poles of the mapping. Analytic dependences are produced between the ordinates of the dynamic characteristic and the parameters of the system. The parameters of the system are synthesized on the example of the UEV-20/5000 test stand.

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Optical

USSR

UDC 629.12.002.22

ADLERSHTEYN, L. TS., LEVIN, B. M., SEREGIN, A. G., SOKOLOV, V. F.,
TOLSTOVA, N. A.

AN OPTICAL INSTRUMENT FOR TEST OPERATIONS ON THE WAYS

Moscow SUDOSTROYENIYE in Russian No. 3, Mar 76 pp 47-50

[Abstract] A historical review of the introduction of optical test instruments to replace such traditional devices as the hose level and plumb bob is followed by the description of a new specialized instrument for testing operation on the ways -- the IG-96 ways sight. This instrument, designed for a combination of testing and marking operations on the building ways, can also be used to check the mutual placement of surfaces of parts and sections of large products of various types in open, closed, horizontal and inclined ways. The design of the projection-visual and reading sections of the optical system of the instrument is described. An illustration of the use of the instrument is presented.

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USSR

UDC 621.384.658:621.3.032.2

DOLGACHEV, G. I., SLIVKOV, I. N. and BLINOV, P. I.

A HIGH PERVEANCE ELECTRONIC-OPTICAL SYSTEM WITH ELECTRON ENERGY RECOUPARATION

Moscow PRIBORY I TEKHNIKA EKSPERIMENTA in Russian, No 2, Mar-Apr 76, pp.
20-22 manuscript received 27 December 1974

[Abstract] The possibility is demonstrated of creating an electronic-optical system with a perveance hundreds of times greater than the perveance of the cathode-anode vacuum gap. The system is designed for switching of the current of a battery and acceleration of electrons in accelerators with inductive energy accumulation. The losses of energy on the electrodes of the system are determined as functions of the operating mode. The possibility is shown of increasing the current transmitted by parallel connection of several closely placed systems. The cathode occupies some 40% of the area of the cross section of these systems in this case.

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USSR

UDC 621.383.621.472

GOLOVNER, T. M., ZHIDKOVA, YE. V., ZAYTSEVA, A. K. and KREYNIN, L. B., All-Union Order of the Red Banner Scientific Research Institute of Current Sources

INFLUENCE OF THE PARAMETERS OF A DOPED FILM ON THE PHOTOELECTRIC CHARACTERISTICS OF SILICON PHOTOCONVERTERS

Tashkent GELIOTEKHNICA in Russian No 1, 1976 pp 3-8 manuscript received 5 May 74

[Abstract] The authors present the results of experimental research on the influence of thickness of a frontal doped region, its film resistance, the imbedded field and the surface concentration of the impurity on the photoelectric characteristics of photoconverters. They demonstrate that the decisive factor which determines the short-wave sensitivity of photoconverters is recombination in the surface layer. Figures 6; references 12: 4 Russian, 8 Western.

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USSR

UDC 771.72

DAVYDOV, V. S., KUZOVLEV, O. P., STARTSEVA, N. M., USANOV, YU. YE.,
FAYERMAN, G. P., SNETKOVA, YE. I.

CHEMICAL-PHOTOGRAPHIC TREATMENT OF UV-SENSITIVE FILMS EXPOSED IN
SPACE

Moscow ZHURNAL NAUCHNOY I PRIKLADNOY FOTOGRAFII I KINEMATOGRAFII
in Russian Vol. 21 No. 2, Mar-Apr 76 pp 81-85 manuscript received
5 Mar 74

[Abstract] Photographic film used to photograph the surface of the earth from an orbiting space station was found to be badly fogged by background cosmic radiation when developed normally in D-19. Two methods were found to reduce fogging: development of the film with a surface-operating developer, which develops only the thin surface layer of the film carrying the latent image formed by the UV radiation, not penetrating into the depth of the emulsion, fogged by cosmic radiation; use in the developer of antifogging substances which reduce the development of the radiation fog and improve the image in this manner.

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USSR

UDC 778.37

DUBOVIK, A. S., ZATSEPIN, YU. A., DARAGAN, A. O., SITSINSKAYA, N. M.,
Institute of Earth Physics, Academy of Sciences, USSR

ILLUMINATION OF IMAGES IN THE SFR, ZHLV-2 AND ZHFR-3 HIGH SPEED CAMERAS

Moscow ZHURNAL NAUCHNOY I PRIKLADNOY FOTOGRAFII I KINEMATOGRAFII
in Russian Vol. 21 No. 1, Jan-Feb 76 pp 5-15 manuscript received
10 Jul 74

[Abstract] When objects of identical brightness are photographed from different distances in these cameras, the luminence of the image changes as follows: a) in the SFR camera, luminence depends on distance L between the instrument and the object photographed as $(1 - F'_1/L)^2$; b) in the ZHFR-3 camera, luminence depends on distance to the object L as in the SFR, as well as the position of the image of the object on the focal arc of the instrument; c) in the ZHLV-2, luminence of the image is independent of the object distance, both as a photorecorder and in the time loop version. All three instruments can be used for photometric measurement of the brightness of luminous processes. Differences in distance to the object being photographed can be considered using the tables and graphs in this article.

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USSR

UDC 536.3

RUBTSOV, N. A. and BAL'TSEVICH, YA. A.

STUDY OF THE THERMAL STATE OF A SYSTEM OF SHIELDS AT CRYOGENIC TEMPERATURES

IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR, SERIYA TEKHNICHESKIKH NAUK in Russian, No 13, Issue 3, 1975 pp 60-65 manuscript received 20 Jan 75

[Abstract] This work, primarily experimental in nature, is generally intended to set the problem of experimental and theoretical studies of the radiation and radiation-conductive heat transfer in multilayer vacuum systems and semitransparent media at cryogenic temperatures. New experimental data are produced on the nature of the temperature field in a system of shields with temperature values of the boundaries of 300-77 K and 77-4.2 K. A mixed system of shields consisting of metal (aluminum) and semitransparent (fluoroplastic) shields is characterized by some smoothing of the temperature profiles (particularly in the area of liquid helium temperatures) which, however, does not lead to a significant increase in the effectiveness of the thermal insulation as a whole. The experimental results indicate a qualitative agreement between temperature fields in the system of shields with the calculated values of temperature distributions in flat layers of a continuous insulating and absorbing medium (with low values of radiating capacities of the hot boundary), having finite values of molecular heat conductivity.

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USSR

RUBTSOV, N. A. and BAL'TSEVICH, YA. A., IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR, SERIYA TEKHNICHESKIKH NAUK, No 13, Issue 3, 1975 pp 60-65

The possibility is provided of analyzing the thermal state of a discrete system of shields from the standpoint of radiation-conductive heat exchange in a layer of a continuous medium.

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USSR

UDC 629.12.06;628.84

BOGDANTSEV, V. P.

DIRECT ACTION CONTROLLERS OF THE CENTRAL AIR CONDITIONING SYSTEM

Leningrad SUDOSTROYENIYE (Shipbuilding) in Russian, No 12
Dec 75 pp 19-22

/Abstract/ Starting with the year 1973 the obsolete air conditioners KTSDN ("Equator") and KTSDV were replaced by the low noise central conditioners of type "Briz" and "Passat"; these are of mean pressure, of centralized cold and heat supply and are provided with surface air-cooling, with two-stage blast heaters, vapor humidifiers and with special direct action temperature regulators. The schemata of the latter and of the "Passat" type conditioner are discussed by reference to diagrams and the principle of a correct selection of the regulator by the conditional transmissive capacity K_v of the regulating valve is indicated. Values of K_v

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BOGDANTSEV, V. P., SUDOSTROYENIYE No 12, Dec 75 pp 19-22

for subcritical and critical steam escape can be determined from given formulas or, more conveniently, from the author's nomograms for saturated steam. The analysis of transient processes of the automatic control system shows that the stability of the system with direct action regulators depends on the correct selection of the control valve by its conditional transmission capacity; by incorrectly selected valve with $K_v=6$ t/hr the system is unstable. Formulas 4, figures 6, no references.

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USSR

UDC 628.85:629.44

KOTENKO, V. D., OSIPOV, V. N., CHERNETSOV, A. A. and TRUSKOVA, L. A.

THE KT-9 INDEPENDENT TRANSPORT AIR CONDITIONER

Moscow KHOLODIL'NAYA TEKHNIKA in Russian, No 1, Jan 76, pp. 19-21

[Abstract] An independent transport air conditioner, the KT-9, has been developed to cool the interior spaces of transport vehicles. The air conditioner is intended to operate with outside air temperatures of 10 to 50 C and relative humidities of up to 98%. Cold productivity is at least 9000 kcal/hr, air throughput 2000 m³/hr, heat transfer surface of condenser 51 m², of air cooler 23 m², power consumption not over 8 kw, sound pressure level 70 db, cooling agent freon-12, weight 400 kg. Diagrams of the device are presented.

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USSR

UDC 536.7

PEREL'SHTEYN, I. I. and PARUSHIN, Ye. B., All-Union Scientific Research Institute for the Refrigeration Industry

METHOD OF DETERMINATION OF THERMODYNAMIC PROPERTIES OF THE PRIMARY COOLING AGENTS USING EXPERIMENTAL DATA

Moscow KHOLODIL'NAYA TEKHNIKA in Russian, No 1, Jan 76, pp. 27-30

[Abstract] The basic thermodynamic equations are produced for the most important cooling agents over a broad range of parameters. These equations can be used to calculate and optimize cooling cycles by computer. The method of composing the equations presented is briefly outlined, as is the method of calculating the thermodynamic properties of the agents.

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USSR

UDC: 621.57.041-213.3

ZAKHAROV, S. A., "Kompressor" Plant, Riga, and MILOVANOV, V. I., Odessa Technological Institute for the Refrigeration Industry

STUDY OF THE INFLUENCE OF CLEARANCES IN THE JOINTS OF A SEALED ROTORARY COMPRESSOR ON ITS CHARACTERISTICS

Moscow KHOLODIL'NAYA TEKHNIKA in Russian, No 3, Mar 76, pp. 14-18

[Abstract] Results are presented from a theoretical and experimental investigation of the influence of clearances in the joints of the eccentric shaft on the rotor-cylinder clearance in a sealed rotary compressor. A method is presented for calculation and experimental determination of the dynamic rotor-cylinder clearance in an operating compressor. The studies show that the increase in clearance in eccentric shaft joints has little influence on the rotor-cylinder clearance or the heat engineering indicators of the compressor. The possibility is determined in principle of increasing the initial maximum permissible clearances in eccentric shaft joints of rotary compressors.

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USSR

UDC 628.84

TSIMERMAN, A. B., MAYSOTSENKO, V. S., PECHERSKAYA, I. M., Odessa Construction Engineering Institute

A NEW TYPE OF INDIRECT EVAPORATING AIR COOLER

Moscow KHOLODIL'NAYA TEKHNIKA in Russian, No 3, Mar 76, pp. 18-21

[Abstract] The operation of an indirect evaporating air cooler is analyzed. The optimal plan for such a device is determined. Results are presented from a new indirect evaporative air cooler. Regenerative indirect evaporative air coolers, conditioners with vapor-compression refrigeration machinery and existing indirect evaporative cooling systems are compared.

USSR

UDC. 621.572

KALNIN', I. M., SUKHOMLINOV, I. Ya., TSIRLIN, B. L., All-Union Scientific Research Institute for Refrigeration Machinery, CHISTYAKOV, F. M., Moscow Higher Technical School imeni N. E. Bauman

ANALYSIS OF THE EFFECTIVENESS OF AIR AND VAPOR COMPRESSION REFRIGERATION MACHINES FOR ABOVE-FREEZING COOLING TEMPERATURES

Moscow KHOLODIL'NAYA TEKHNKA in Russian, No 4, Apr 76, pp. 12-18

[Abstract] The effectiveness of two types of machines is compared for air cooling machines utilizing an open cycle as is used in the TKhM2-50 machine. Since the technical literature contains no data on the influence of the resistance of the system on the summary effectiveness of air cooling machines and installations with vapor compression cooling machines, this question is of considerable importance. It is concluded that the use of air cooling machines operating on an open cycle for general industrial and comfort air conditioning systems is energetically not desirable.

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USSR

UDC: 621.56/.57:62-19

YASTREBOV, V. S., KOVAL', G. A., Odessa Special Design Bureau for Refrigeration Machinery

OPERATIONAL RELIABILITY OF KhM-FV20 REFRIGERATION MACHINES

Moscow KHOLOGIL'NAYA TEKHNKA in Russian, No 4, Apr 76, pp. 22-26

[Abstract] Studies were performed under operating conditions of the reliability of KhM-FV20/I and KhM-FV20/II refrigeration machines in order to determine the wear-resistance of friction couples and the service life of the FV20 compressor. The studies revealed the least reliable parts, units and elements of the machines: the intake and delivery valve plates, compressor gland, 12TRV-40 heat regulating valve, TR-102-Kh temperature relay sensor, RD-3-01 pressure relay. The studies resulted in revision to the operating manual.

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SHLYAKHOVETSKIY, V. M., Krasnodar Polytechnical Institute

SYSTEMATIZATION OF REFRIGERATION MACHINE CYCLES

Moscow KHOLODIL'NAYA TEKHNIKA in Russian, No 4, Apr 76, pp. 18-22

[Abstract] It is suggested that the basic thermodynamic processes be used as a basis for the creation of a classification system for cooling cycles. A table is composed of combinations of thermodynamic parameters describing the processes in the cycles, based on which the thermodynamically permissible cycles are estimated. A classification of cycles is presented as to the nature of the processes composing the cycle and the configuration of the cycle. A system grid is composed in which thermodynamically permissible cycles are grouped. A method is described for synthesizing a cycle based on the initial compression process. Areas of application of this system are indicated, and its possibility for use for the prediction of new types of cooling machines is noted.

USSR

UDC 621.524

ZATSELYAPIN, A. M., STANISHEVSKIY, E. Ya.

ULTRA-HIGH VACUUM DEVICE

Moscow PRIBORY I TEKHNIKA EKSPERIMENTA in Russian No 4 1975 pp 150-151 manuscript received 18 Oct 74

[Abstract] The device described is designed for investigating crystallization and for vaporizing substances of low volatility. The operating chamber has a volume of about 3 l, and consists of rolled steel in the form of a cube 200 mm on a side. The upper part of the instrument is occupied by two pumps, type NORD-100, and all evacuating assemblies are made of Kh18N10T stainless steel. The heating for degassing in the ultra-high vacuum section is supplied by quartz radiators KI-220-1000-5 or KG-220-1000-3 with an iodine cycle, two pairs of which can easily provide heating of up to 300° C. Control of the heating system can be realized semi-automatically. Under favorable circumstances, a limiting value of about $5 \cdot 10^{-9}$ Tor. can be obtained for from four to eight hours. The equipment is supplemented by mass-spectrometer

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USSR

ZATSELYAPIN, A. M., STANISHEVSKIY, E. Ya., PRIBORY I TEKHNIKA EKSPERIMENTA No 4 1975 pp 150-151

analyzers APDP-2, IPDO-2, and APDM-1 for determining partial pressures of residual gases. A photograph of the equipment is provided. One illustration, bibliography of five titles: three Russian, two Western.

NOVIKOV, B. V., BENEMANSKAYA, G. V. and CHEREDNICHENKO, A. Ye., Leningrad State University

A CRYOSTAT FOR BOMBARDMENT OF CRYSTALS WITH ELECTRONS AND OPTICAL INVESTIGATIONS

Moscow PRIBORY I TEKHNIKA EKSPERIMENTA in Russian, No 2, Mar-Apr 76, pp. 216-217 manuscript received 16 July 75

[Abstract] A glass cryostat is described, allowing crystals to be cooled in a high vacuum ($p \approx 10^{-7}$ torr) to liquid helium temperatures and bombarded with electrons. The instrument is distinguished by its simplicity and reliability and is intended for optical and photoelectric investigations of crystals. The instrument consists of two glass Dewar vessels: the internal vessel, closed at the top with a cap, through which liquid helium is poured, and the external vessel, which is filled with liquid nitrogen. Inside the internal vessel is a molybdenum bar 2 mm in diameter, the lower end of which is turned at a slight angle to the vertical. Specimens are glued to the area thus formed. The inner vessel is equipped with a valve for evacuation as well as ground joints allowing specimens to be changed or the crystal to be rotated around the vertical axis of the instrument without breaking the vacuum if necessary.

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CSO: 1861

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